SOIL SURVEY OF

Dallam County, Texas

United States Department of Agriculture
Soil Conservation Service and
Forest Service
In cooperation with
Texas Agricultural Experiment Station

Issued March 1975

Major fieldwork for this soil survey was done in the period 1960–68. Soil names and descriptions were approved in 1970. Unless otherwise indicated, statements in this publication refer to conditions in the county in 1970. This survey was made cooperatively by the Soil Conservation Service, the Forest Service, and the Texas Agricultural Experiment Station. It is part of the technical assistance furnished to the Dallam Soil and Water Conservation District.

Copies of the soil map in this publication can be made by commercial photographers, or they can be purchased on individual order from the Cartographic Division, Soil Conservation Service, U.S. Department of Agriculture, Washington, D.C. 20250.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY contains information that can be applied in managing farms and ranches; in selecting sites for roads, ponds, buildings, and other structures; and in judging the suitability of tracts of land for farming, industry, and recreation.

Locating Soils

All the soils of Dallam County are shown on the detailed map at the back of this publication. This map consists of many sheets made from aerial photographs. Each sheet is numbered to correspond with a number on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbols. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside and a pointer shows where the symbol belongs.

Finding and Using Information

The "Guide to Mapping Units" can be used to find information. This guide lists all the soils of the county in alphabetic order by map symbol and gives the capability classification and range site of each. It also shows the page where each soil is described and the page for the capability unit and range site in which the soil has been placed.

Individual colored maps showing the relative suitability or degree of limitation of soils for many specific purposes can be developed by using the soil map and the information in the text. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

Farmers and those who work with farmers can learn about use and management of the soils from the soil descriptions and from the discussions of the range sites.

Game managers, sportsmen, and others can find information about soils and wildlife in the section "Use of the Soils for Wildlife."

Ranchers and others can find, under "Use of the Soils for Range," groupings of the soils according to their suitability for range, and also the names of many of the plants that grow on each range site.

Community planners and others can read about soil properties that affect the choice of sites for nonindustrial buildings and for recreation areas in the sections "Engineering Uses of the Soils," "Use of the Soils for Recreation," and "Use of the Soils in Town and Country Planning."

Engineers and builders can find, under "Engineering Uses of the Soils," tables that contain estimates of soil properties and information about soil features that affect engineering practices.

Scientists and others can read about how the soils formed and how they are classified in the section "Formation and Classification of the Soils."

Newcomers to Dallam County will be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the information about the county given at the beginning of the publication.

Cover: **Aerial view of a circular sprinkler system in an area of Dallam loamy fine sand.**

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Issued March 5, 1975

SOIL SURVEY OF DALLAM COUNTY, TEXAS

BY ALAN R. FORD AND RICHARD W. FOX, SOIL CONSERVATION SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE AND FOREST SERVICE, IN COOPERATION WITH THE TEXAS AGRICULTURAL EXPERIMENT STATION

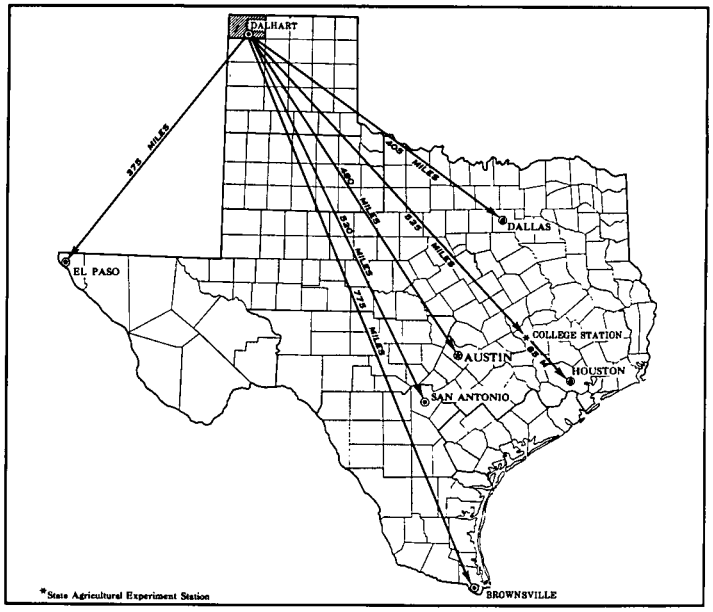

***Figure 1.*—Location of Dallam County in Texas.**

DALLAM COUNTY is in the northwestern corner of the Panhandle of Texas (fig. 1). The total area is 956,160 acres, or 1,494 square miles. Elevation ranges from about 3,800 feet at Dalhart, the county seat, to about 4,600 feet in the northwestern part of the county.

The main crops grown in the county are dryland and irrigated wheat and grain sorghum. Minor acreages of corn and alfalfa are grown, and the acreage of corn is increasing. Beef production is important, and native range covers about 55 percent of the county.

The county is in the southern part of the Great Plains. The topography is the smooth tableland characteristic of the High Plains, broken in a few places by indented playa basins and shallow drains. The soils formed from Rocky Mountain outwash (*2*)[1] and an overlying loess mantle (*3*).

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in Dallam County, where they are located, and how they can be used. The soil scientists went into the county knowing they likely would find many soils they had already seen and perhaps some they had not. They observed the steepness, length, and shape of slopes, the size and speed of streams, the kinds of native plants or crops, the kinds of rock, and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by the action of plant roots.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. The *soil series* and the *soil phase* are the categories of soil classification most used in a local survey.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Conlen and Dallam, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that affect their behavior in the undisturbed landscape.

Soils of one series can differ in texture of the surface soil and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Perico fine sandy loam, 1 to 3 percent slopes, is one of several phases within the Perico series.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show range, buildings, field borders, trees, and other details that help in drawing boundaries accurately. The soil map at the back of this publication was prepared from the aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning the management of farms and fields, a mapping unit is nearly equivalent to a soil phase. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil phase.

Some mapping units are made up of soils of different

[1] Italic numbers in parentheses refer to Literature Cited, p. 46.

series, or of different phases within one series. Three such kinds of mapping units are shown on the soil map of Dallam County: soil complexes, soil associations, and undifferentiated groups.

A soil complex consists of areas of two or more soils, so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area of a complex contains some of each of the two or more dominant soils, and the pattern and relative proportions are about the same in all areas. The name of a soil complex consists of the names of the dominant soils, joined by a hyphen. Valentine-Spurlock complex, 5 to 15 percent slopes, is an example.

A soil association is made up of adjacent soils that occur as areas large enough to be shown individually on the soil map but are shown as one unit because the time and effort of delineating them separately cannot be justified. There is a considerable degree of uniformity in pattern and relative extent of the dominant soils, but the soils may differ greatly one from another. The name of an association consists of the names of the dominant soils, joined by a hyphen. Kerrick-Plack association, nearly level, is an example.

An undifferentiated group is made up of two or more soils that could be delineated individually but are shown as one unit because, for the purpose of the soil survey, there is little value in separating them. The pattern and proportion of soils are not uniform. An area shown on the map may be made up of only one of the dominant soils, or of two or more. The name of an undifferentiated group consists of the names of the dominant soils, joined by "and." Vingo and Dallam soils, undulating, is an example.

General Soil Map

The general soil map at the back of this survey shows, in color, the soil associations in Dallam County. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and is named for the major soils. The soils in one association may occur in another, but in a different pattern.

A map showing soil associations is useful to people who want a general idea of the soils in a county, who want to compare different parts of a county, or who want to know the location of large tracts that are suitable for a certain kind of farming or other land use. Such a map is not suitable for planning the management of a farm or field, because the soils in any one association ordinarily differ in slope, depth, and other characteristics that affect management.

The five associations in this county are each described in the following pages. The terms for texture in the title of an association apply to the surface layer. For example, in the title of association 3, the word "loamy" refers to texture of the surface layer.

1. *Dallam-Perico association*

Deep, noncalcareous and calcareous, loamy soils

This association consists of nearly level and gently sloping soils on plains. It make up about 26 percent of the county (fig. 2). Dallam fine sandy loams account for about 60 percent of this association, and Perico soils about 27 percent. The remaining 13 percent is less extensive areas of loamy fine sands of the Dallam, Rickmore, Spurlock, and Sunray series.

The Dallam soils in this association have a brown fine sandy loam surface layer about 8 inches thick. Under this is about 49 inches of sandy clay loam that is yellowish brown in the upper part and pink in the lower. The next lower layer is reddish-yellow clay loam.

Perico soils have a brown, calcareous fine sandy loam surface layer about 7 inches thick. Below this is brown, light-brown, and yellowish-brown sandy clay loam that reaches to a depth of 69 inches. The next lower layer, to a depth of 88 inches, is reddish-yellow clay loam.

This association is cultivated and used for range. Both dryland and irrigated crops are grown. Sprinkler systems are the main method of irrigation. Some native range is being converted to cropland where irrigation water is available. The hazard of soil blowing is moderate.

2. *Dallam-Vingo-Spurlock association*

Deep, noncalcareous and calcareous, sandy and loamy soils

This association is made up of nearly level to gently sloping soils that form a gently undulating and hummocky landscape. It accounts for about 25 percent of the county (fig. 3).

Dallam loamy fine sand makes up about 61 percent of this association; Vingo loamy fine sand about 19 percent; Spurlock soils 10 percent; and less extensive areas of Dallam fine sandy loam and Perico and Valentine soils, the remaining 10 percent.

The Dallam soil in this association has a brown loamy fine sand surface layer about 12 inches thick. The next layer is brown sandy clay loam to clay loam in the upper 23 inches, pink clay loam containing soft powdery lime in the next 12 inches, and reddish-yellow, calcareous clay loam below a depth of 47 inches.

Vingo soils have a yellowish-brown loamy fine sand surface layer about 18 inches thick. The next layer is yellowish-brown fine sandy loam about 30 inches thick. Below a depth of 48 inches is yellowish-red sandy clay loam.

Spurlock soils are calcareous and have a brown fine sandy loam surface layer about 6 inches thick. The next layer is about 8 inches of brown sandy clay loam. The underlying layers are clay loam. In sequence from the top, they are 10 inches of pale brown, 24 inches of very pale brown, 24 inches of strong brown, and 18 inches of reddish yellow.

Most of this association is in range, but some areas are cultivated. In recent years, some large ranches have been cultivated to irrigated row crops. The hazard of soil blowing on these soils is moderate to high.

3. *Sunray-Conlen association*

Deep, calcareous, loamy soils

This association is made up of nearly level to gently sloping soils that are dissected by a few drainageways. It makes up about 25 percent of the county (fig. 4).

Sunray soils cover about 34 percent of the association; Conlen soils about 32 percent; and less extensive areas of Church, Dumas, Gruver, Perico, Plack, and Texline soils the remaining 34 percent.

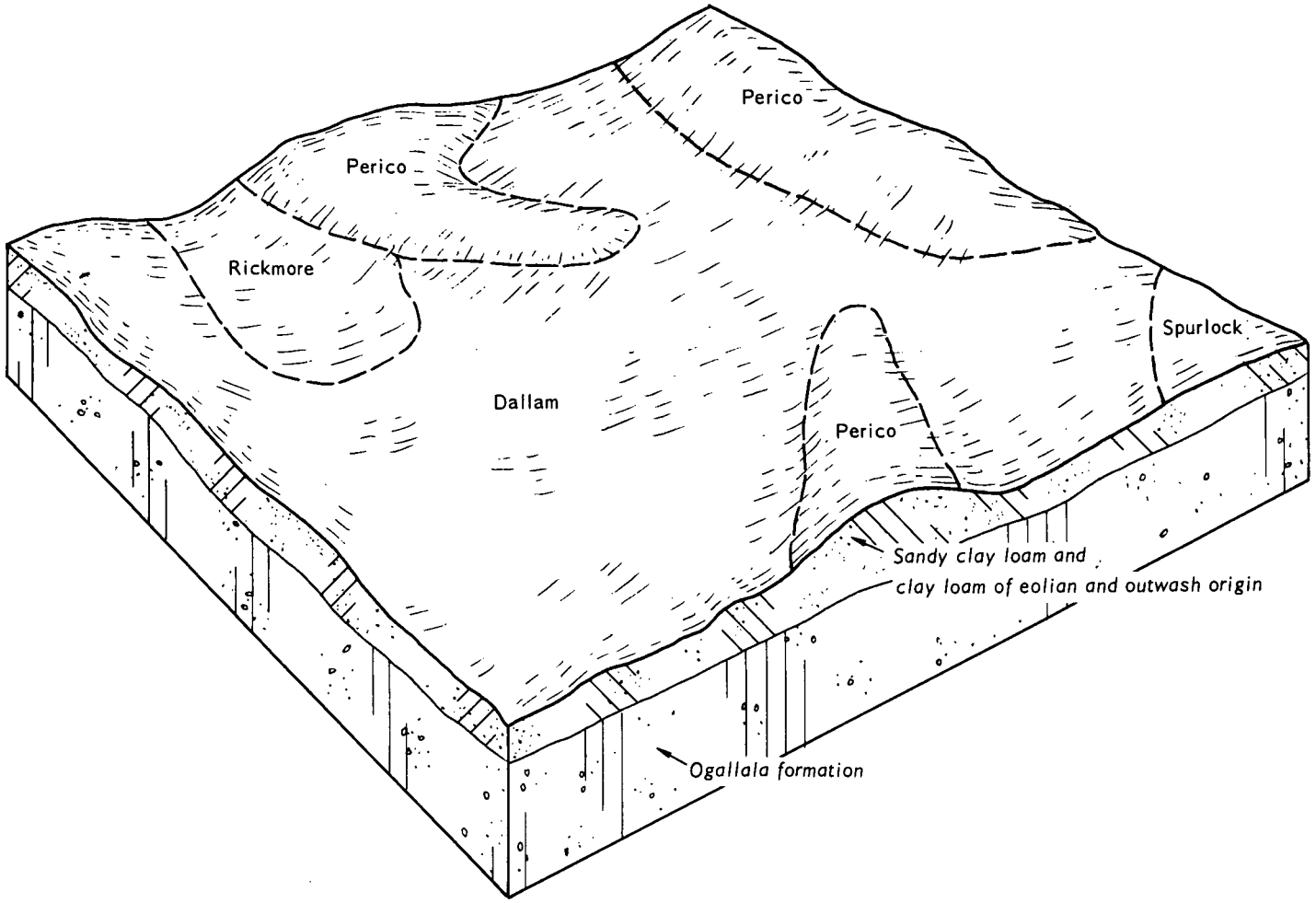

***Figure 2.*—Relationship of soils and underlying material in the Dallam-Perico association.**

Sunray soils have a dark grayish-brown loam surface layer about 10 inches thick. The lower layers are clay loam. These layers, in sequence, are 7 inches of dark yellowish-brown, 7 inches of grayish-brown, 26 inches of white, and 30 inches of reddish-yellow clay loam.

Conlen soils have a brown loam surface layer about 10 inches thick. The lower layers are clay loam. They are, in sequence, brown in the first 5 inches, very pale brown in the next 10 inches, and reddish yellow below a depth of 25 inches.

This association is used for crops and range. The lime in these soils causes chlorosis in some crops. The hazards of soil blowing and water erosion are moderate to high.

4. Gruver-Sherm-Dumas association

Deep, noncalcareous, loamy soils

This association is made up of nearly level and gently sloping soils on plains. It makes up about 19 percent of the county (fig. 5).

Gruver soils account for about 33 percent of the association; Sherm soils about 18 percent; Dumas soils about 16 percent; and less extensive areas of Conlen, Dallam, Ness, Rickmore, Sunray, and Texline soils the remaining 33 percent.

Gruver soils have a dark grayish-brown loam surface layer about 7 inches thick. The lower layers are clay loam. They are, in sequence, 9 inches of dark grayish-brown, 12 inches of light yellowish-brown, 12 inches of pink, and 30 inches of light-brown clay loam. Below a depth of 72 inches and extending to 92 inches is reddish-yellow sandy clay loam.

Sherm soils have a dark grayish-brown clay loam surface layer about 10 inches thick. The lower layers, to a depth of 60 inches, are brown clay. Below this is an 18-inch layer of pink clay loam and a 22-inch layer of reddish-yellow clay loam.

Dumas soils have a dark-brown loam surface layer about 6 inches thick. The underlying layers, to a depth of 60 inches, are clay loam. They are, in sequence, 10 inches of dark-brown, 8 inches of dark yellowish-brown, and 36 inches of brown clay loam. Below this is 18 inches of strong-brown sandy clay loam and 26 inches of reddish-yellow clay loam.

This association is used for crops and range. These soils are well suited to irrigation. The hazard of water erosion is moderate in some of the gently sloping soils.

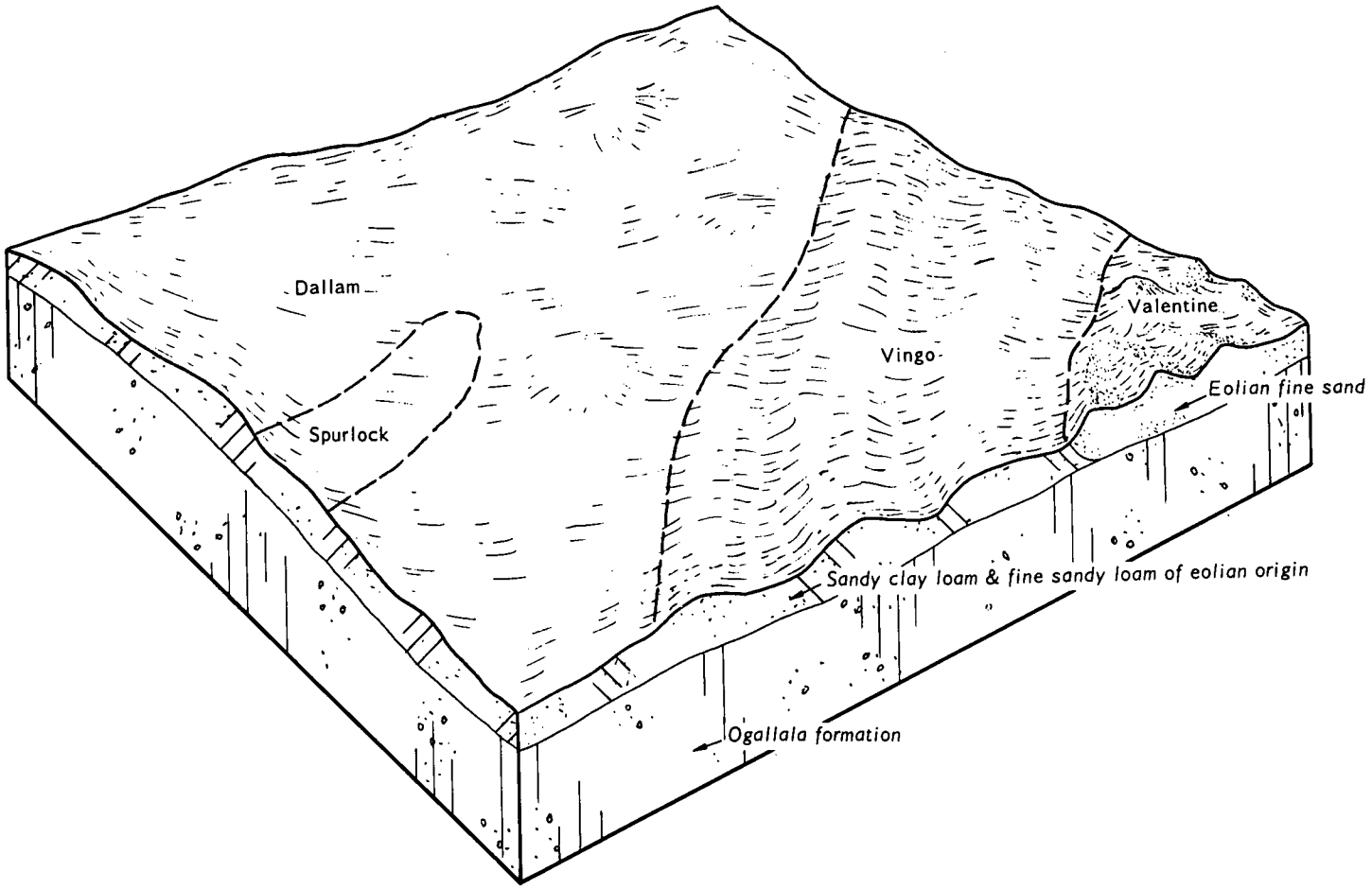

***Figure 3.*—Relationship of soils and underlying material in the Dallam-Vingo-Spurlock association.**

5. Plack-Berthoud association

Very shallow to deep, calcareous, loamy soils

The nearly level to sloping soils of this association are on plains, on the breaks along the drainageways, and on escarpments above the drains. The association accounts for about 5 percent of the county (fig. 6).

Plack soils make up about 40 percent of the association; Berthoud soils about 25 percent; and less extensive areas of Conlen, Corlena, Dalupe, Humbarger, Kerrick, Spurlock, and Sunray soils the remaining 35 percent.

Plack soils have a grayish-brown loam surface layer, about 8 inches thick, that overlies white, indurated, platy caliche.

Berthoud soils have a brown loam surface layer about 6 inches thick. The next layer, about 24 inches thick, is clay loam. It is light brownish gray in the upper part and light yellowish brown in the lower part. Below this is strong-brown clay loam.

Most of this association is in range. The hazards of soil blowing and water erosion are moderate.

Descriptions of the Soils

In this section the soil series and mapping units in Dallam County are described and their use and management are discussed. Each soil series is described in detail, and then, briefly, each mapping unit in that series. Unless it is specifically mentioned otherwise, it is to be assumed that what is stated about the soil series holds true for the mapping units in that series. Thus, to get full information about any one mapping unit, it is necessary to read both the description of the mapping unit and the description of the soil series to which it belongs.

An important part of the description of each soil series is the soil profile, that is, the sequence of layers from the surface downward to rock or other underlying material. Each series contains two descriptions of this profile. The first is brief and in terms familiar to the layman. The second is much more detailed and is for those who need to make thorough and precise studies of soils. The profile described in the series is representative for mapping units in that series. If the profile of a given mapping unit is different from the one described for the series, these differences are stated in describing the mapping unit, or they are differences that are apparent in the name of the mapping unit. Color terms are for dry soil unless otherwise stated.

Following the name of each mapping unit is a symbol in parentheses. This symbol identifies the mapping unit on the detailed soil map. Listed at the end of each description of a mapping unit are the capability unit and range site in which the mapping unit has been placed. The page

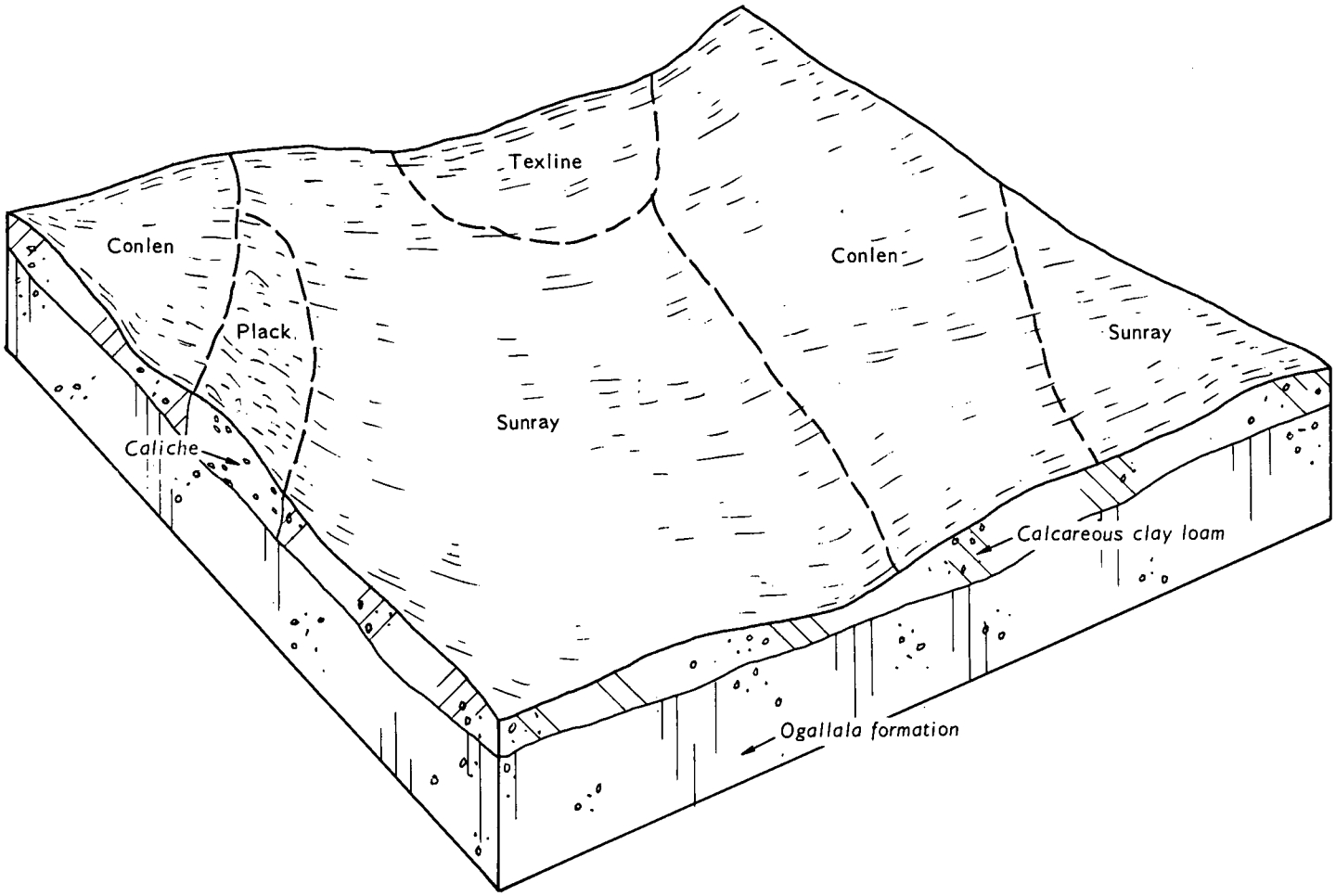

***Figure 4.*—Relationship of soils and underlying material in the Sunray-Conlen association.**

for the description of each capability unit and range site can be learned by referring to the "Guide to Mapping Units" at the back of this survey.

The acreage and proportionate extent of each mapping unit are shown in table 1. Many of the terms used in describing soils can be found in the Glossary, and more detailed information about the terminology and methods of soil mapping can be obtained from the Soil Survey Manual (*6*).

Berthoud Series

The Berthoud series consists of deep, well-drained, calcareous soils that are gently sloping to sloping. These soils are on slopes on uplands above drainageways.

In a representative profile (fig. 7), the surface layer is brown, calcareous loam about 6 inches thick. The next layer is calcareous clay loam about 24 inches thick. The upper part is light brownish gray, and the lower part is light yellowish brown. The underlying material, extending to a depth of 67 inches, is strong-brown, calcareous clay loam.

Berthoud soils are mainly in range, but a small acreage is dryfarmed and irrigated. The main crops are wheat and grain sorghum. The permeability of these soils is moderate, and runoff is medium to rapid. Available water capacity is high.

Representative profile of Berthoud loam, 5 to 8 percent slopes, 2 miles northwest of Dalhart, Tex., by U.S. Highway 87, then 12.5 miles west on Farm Road 1727, then 4.5 miles west on South Sedan Road (the county road extension of Farm Road 1727), and 100 feet south of the road.

A1—0 to 6 inches, brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak, coarse, prismatic structure parting to moderate, fine, granular; slightly hard, friable; many fine roots; few fine pores; few worm casts; calcareous; moderately alkaline; clear, smooth boundary.

B2—6 to 18 inches, light brownish-gray (10YR 6/2) clay loam, brown (10YR 5/3) moist; weak, coarse, prismatic structure parting to weak and moderate, fine, subangular blocky; hard, friable; many fine roots; many fine pores; many worm casts; few, faint, soft calcium carbonate masses; calcareous; moderately alkaline; gradual, wavy boundary.

B3ca—18 to 30 inches, light yellowish-brown (10YR 6/4) clay loam, yellowish brown (10YR 5/4) moist; weak, coarse, prismatic structure parting to weak, fine, granular; hard, friable; about 8 percent calcium carbonate as soft masses and coatings on ped surfaces; calcareous; moderately alkaline; gradual, wavy boundary.

Cca—30 to 67 inches, strong-brown (7.5YR 5/6) clay loam; massive; slightly hard, very friable; few calcium carbonate films and threads on ped surfaces; calcareous; moderately alkaline.

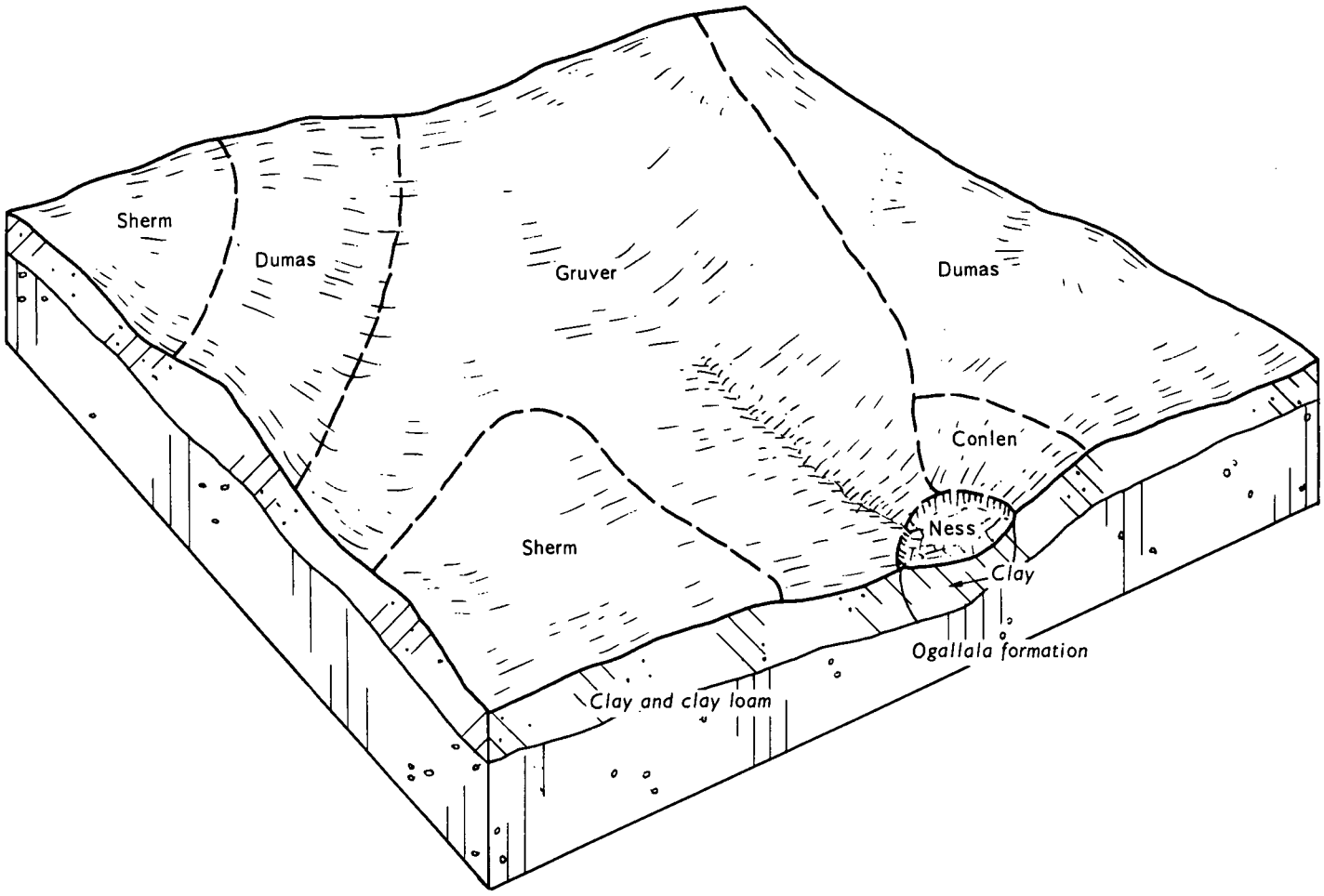

Figure 5.—**Relationship of soils and underlying material in the Gruver-Sherm-Dumas association.**

The solum ranges from 30 to 38 inches in thickness. All horizons are loam or clay loam, but content of clay ranges from 20 to 32 percent.

The A horizon ranges from 6 to 10 inches in thickness, and it is grayish brown, brown, or pale brown in color. The B2 horizon ranges from 12 to 22 inches in thickness. The B3ca horizon is light brownish gray, pale brown, very pale brown, light yellowish brown, or pink. It is as much as 13 inches thick, but it is absent in some places. Calcium carbonate content of the B horizon ranges from a few films and threads to about 10 percent soft masses. The Cca horizon is very pale brown, strong brown, or light brownish gray.

Berthoud loam, 3 to 5 percent slopes (BeC).—This gently sloping soil is on the sides of major drainageways. Areas of this soil are mainly long and narrow, and they average about 130 acres in size.

This soil has a brown, calcareous, loam surface layer about 6 inches thick. The next layer is brown, calcareous clay loam about 26 inches thick. The underlying material is strong-brown clay loam that contains some soft powdery lime.

Included with this soil in mapping are small areas of Conlen, Humbarger, Plack, and Sunray soils.

Runoff is medium. In cultivated areas of this Berthoud loam, the hazards of water erosion and soil blowing are moderate. Terraces and contour farming help to control water erosion and to conserve soil moisture. Keeping crop residue on the surface and irrigation by the sprinkler method are good management practices on this soil. Capability unit IVe–1, dryland, and IVe–1, irrigated; Hardland Slopes range site.

Berthoud loam, 5 to 8 percent slopes (BeD).—This sloping soil is in long, narrow areas along major drainageways. Slopes are dominantly 6 and 7 percent. This soil has the profile described as representative for the series. Included with it in mapping are small areas of Plack and Spurlock soils and areas of deep, calcareous sandy loams that do not contain soft, powdery lime.

This Berthoud loam is used for range. Runoff is rapid. Capability unit VIe–2, dryland; Hardland Slopes range site.

Church Series

The Church series consists of deep, nearly level, very slowly permeable soils adjacent to saline playas. These soils are strongly alkaline.

In a representative profile, the surface layer is about 7 inches of calcareous, gray clay loam. The next layer is light-gray, calcareous clay about 21 inches thick. The underlying material, extending to a depth of 60 inches, is white, calcareous clay loam.

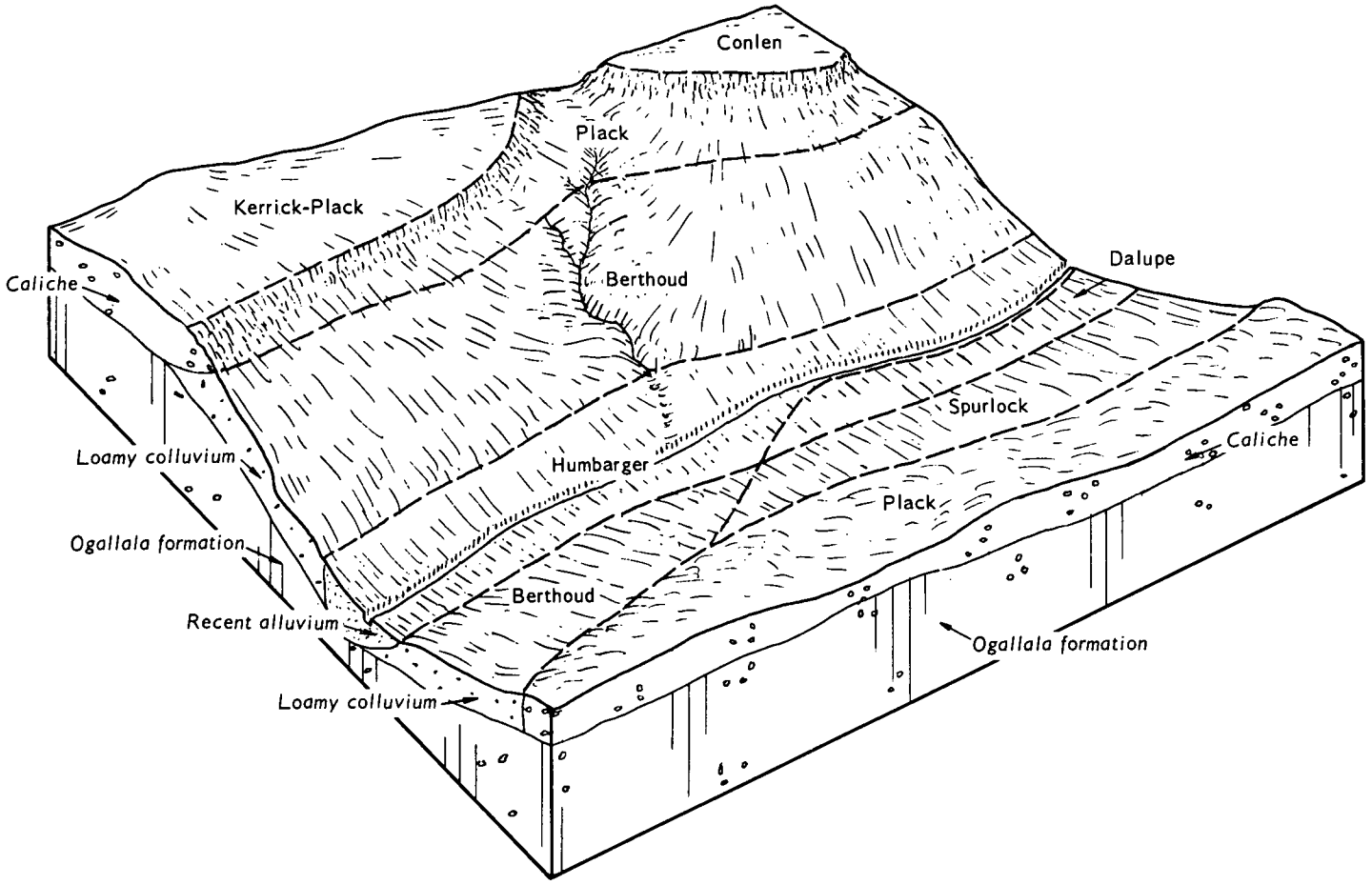

***Figure 6.*—Relationship of soils and underlying material in the Plack-Berthoud association.**

TABLE 1.—*Approximate acreage and proportionate extent of the soils*

Soil	Acres	Percent	Soil	Acres	Percent
Berthoud loam, 3 to 5 percent slopes	8,000	0.8	Perico loamy fine sand, 0 to 3 percent slopes	6,200	.7
Berthoud loam, 5 to 8 percent slopes	4,000	.4	Plack loam, 0 to 3 percent slopes	20,500	2.1
Church soils	1,800	.2	Rickmore fine sandy loam, 0 to 1 percent slopes	17,800	1.9
Conlen loam, 0 to 3 percent slopes	80,600	8.5	Rickmore loamy fine sand, 0 to 3 percent slopes	1,800	.2
Conlen loam, 3 to 5 percent slopes	7,400	.8	Sherm clay loam	32,800	3.5
Corlena soils	5,100	.5	Spurlock fine sandy loam, 0 to 3 percent slopes	20,300	2.2
Dallam fine sandy loam, 0 to 1 percent slopes	130,400	13.5	Spurlock fine sandy loam, 3 to 5 percent slopes	1,900	.2
Dallam fine sandy loam, 1 to 3 percent slopes	34,200	3.6	Spurlock soils, hummocky	11,300	1.2
Dallam loamy fine sand, 0 to 3 percent slopes	166,100	17.3	Sunray loam, 0 to 1 percent slopes	72,500	7.6
Dalupe fine sandy loam	3,800	.4	Sunray loam, 1 to 3 percent slopes	32,700	3.4
Dumas loam, 0 to 1 percent slopes	32,000	3.4	Texline loam, 0 to 1 percent slopes	17,900	1.8
Dumas loam, 1 to 3 percent slopes	6,100	.6	Valentine fine sand	5,500	.6
Gruver loam, 0 to 1 percent slopes	80,000	8.4	Valentine-Spurlock complex, 5 to 15 percent slopes	3,300	.3
Gruver loam, 1 to 3 percent slopes	4,300	.4	Vingo and Dallam soils, undulating	46,500	4.9
Humbarger loam	5,230	.6			
Kerrick-Plack association, nearly level	14,130	1.5	Total	956,160	100.0
Ness clay	4,000	.4			
Perico fine sandy loam, 0 to 1 percent slopes	43,600	4.5			
Perico fine sandy loam, 1 to 3 percent slopes	31,700	3.3			
Perico fine sandy loam, 3 to 5 percent slopes	2,700	.3			

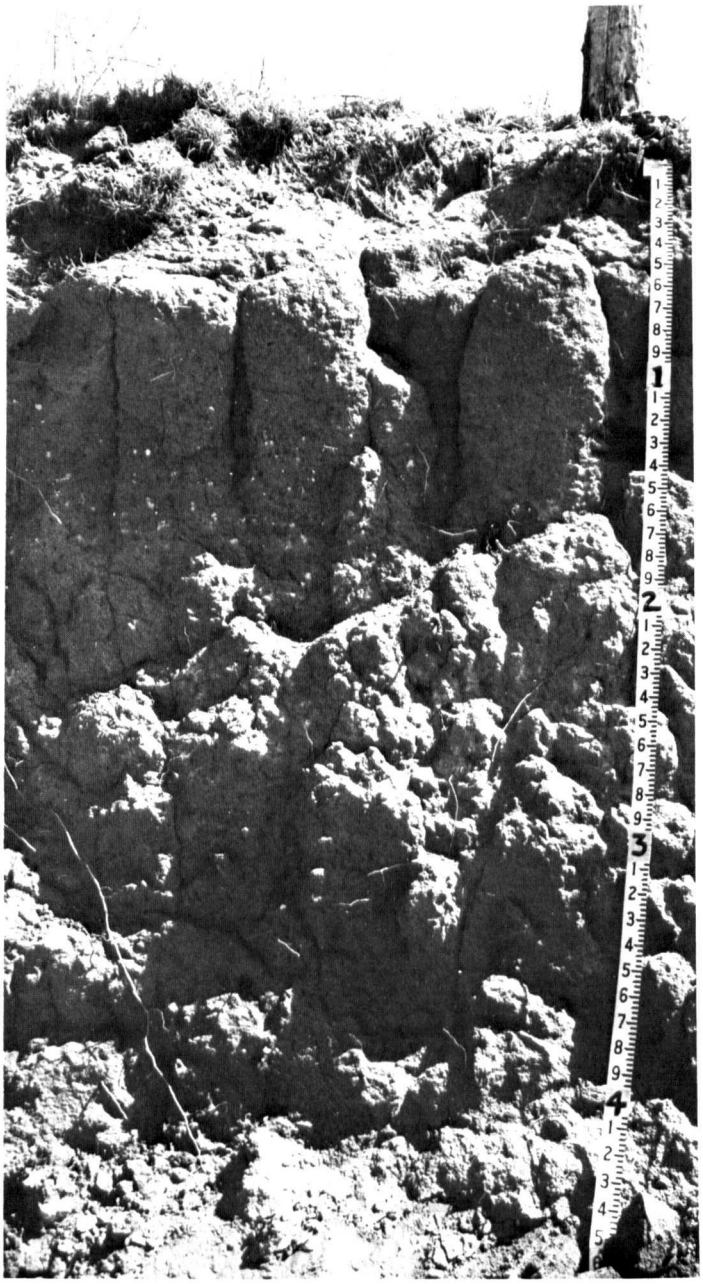

Figure 7.—**Prismatic structure in a profile of Berthoud loam, 5 to 8 percent slopes.**

Church soils are used for range. These soils are moderately well drained. Their available water capacity is moderate, and runoff is slow. They are usually dry but have a water table at or near the surface during wet seasons. These soils are highly saline.

Representative profile of Church clay loam, in an area of Church soils, 13 miles east of Texline, Tex., on Ranch Road 296, then 2 miles north of the intersection with Ranch Road 1879, and 2,600 feet east of right-of-way, in range. This site is on the south side of Flater Lake.

A1—0 to 7 inches, gray (10YR 5/1) clay loam, dark gray (10YR 4/1 moist; weak, coarse, prismatic structure parting to moderate, medium, subangular blocky; hard, firm; many fine roots; calcareous; strongly alkaline; clear, smooth boundary.

B21—7 to 12 inches, light-gray (10YR 7/2) clay, grayish brown (10YR 5/2) moist; weak, coarse, prismatic structure parting to moderate, medium, blocky and subangular blocky; very hard, firm; about 5 percent calcium carbonate in soft masses; few strong-brown (7.5YR 5/6) mottles on ped surfaces; few cracks filled with material from above; calcareous; strongly alkaline; clear, wavy boundary.

B22ca—12 and 28 inches, light-gray (10YR 7/2) clay, grayish-brown (10YR 5/2) moist; strong, coarse, blocky structure; very hard, firm; few roots along ped surfaces; about 20 percent of ped surfaces coated with white (10YR 8/1) calcium carbonate; calcareous; strongly alkaline; gradual, wavy boundary.

C—28 to 60 inches, white (10YR 8/1) clay loam, light gray (10YR 7/2) moist; massive; very hard, firm; few soft calcium carbonate masses; calcareous; strongly alkaline.

The solum ranges from 20 to 36 inches in thickness. The A horizon is gray to grayish brown or light brownish gray in color, is 5 to 9 inches thick, and has a texture of clay loam to clay or sandy clay loam.

The B horizon ranges from gray to grayish brown, light gray, or light brownish gray in color; from 15 to 27 inches in thickness; and from clay to clay loam in texture. This horizon is 35 to 50 percent clay. The amount of visible calcium carbonate in this horizon ranges from 5 to about 80 percent and is in the form of soft masses and coatings on ped surfaces.

The C horizon is gray to light gray or white clay loam to clay. It is more than 35 percent clay.

Church soils (Ch).—These nearly level soils are on benches around the salty playas. The areas are about 300 acres in size.

The surface layer is clay, clay loam, or sandy clay loam. Soils similar to Church, but less clayey throughout, also make up part of the unit. Depressions up to 10 feet across and 1 foot deep are common on Church soils. Included with these soils in mapping are Dalupe, Humbarger, and Ness soils.

These Church soils are used for range. They are subject to a moderate hazard of soil blowing and a slight hazard of water erosion. A good cover of grasses is needed to control soil blowing. Capability unit IVe–4, dryland, and IIIe–6, irrigated; High lime range site.

Conlen Series

The Conlen series consists of deep, moderately permeable, calcareous soils on uplands. These nearly level to gently sloping soils are on broad plains.

In a representative profile, the surface layer is brown, calcareous loam about 10 inches thick. The next layer, extending to a depth of 80 inches, is calcareous clay loam. In sequence from the top, the first 5 inches of this layer is brown, the next 10 inches is very pale brown, and the lower 55 inches is reddish yellow.

Conlen soils are well drained. Runoff is medium, and their available water capacity is moderate. The soft powdery lime causes chlorosis of some plants.

Conlen soils are used for range and crops. Crops are dryland and irrigated wheat, grain sorghum, and a small acreage of corn.

Representative profile of Conlen loam, 0 to 3 percent slopes, 8 miles north of Conlen, Tex., on Farm Road 807, then 150 feet east of right-of-way in range.

A1—0 to 10 inches, brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; weak, fine, granular structure; slightly hard, friable; many roots; calcareous; moderately alkaline; gradual, smooth boundary.

B21ca—10 to 15 inches, brown (10YR 5/3) clay loam, brown (10YR 4/3) moist; moderate, medium, subangular blocky structure; slightly hard, friable; many worm casts; estimated 10 percent calcium carbonate as films, threads, and soft masses; calcareous; moderately alkaline; gradual, wavy boundary.

B22ca—15 to 25 inches, very pale brown (10YR 7/3) clay loam, yellowish brown (10YR 5/4) moist; weak, medium, subangular blocky structure; hard, friable; estimated 40 percent calcium carbonate as weakly cemented concretions and soft masses; calcareous; moderately alkaline; clear, wavy boundary.

B23tca—25 to 80 inches, reddish-yellow (7.5YR 7/6) clay loam, reddish yellow (7.5YR 6/6) moist; moderate, medium, subangular blocky structure; hard, friable; few clay films; estimated 20 percent calcium carbonate as coatings on ped surfaces and as soft masses

The solum is more than 60 inches thick. The A horizon ranges from grayish brown to brown in color and from 9 to 12 inches in thickness.

The B21ca horizon ranges from brown to yellowish brown, pale brown, yellowish brown, or light brown in color. It is 5 to 10 inches thick, and the amount of visible calcium carbonate is 5 to 15 percent.

The B22ca horizon is light brown to pale brown, very pale brown, pink, or reddish yellow. It is 10 to 20 inches thick and 35 to 60 percent visible calcium carbonate.

The B23tca horizon is yellowish red to reddish yellow and is 5 to 25 percent visible calcium carbonate.

Conlen loam, 0 to 3 percent slopes (CoB).—This nearly level to gently sloping soil is on broad upland plains. Soil areas are smooth and average about 110 acres in size. This soil has the profile described as representative for the Conlen series.

Included with this soil in mapping are small areas of Kerrick, Plack, and Sunray soils.

The hazards of soil blowing and water erosion are moderate. Crop residues left on the surface help reduce soil blowing. Terraces and contour farming on gently sloping areas slow runoff and reduce water erosion. Lower layers should not be mixed into the surface layer when this soil is plowed. A properly designed irrigation system is needed to meet the needs of soil and plants and to control water. Capability unit IVe–1, dryland, and IIIe–5, irrigated; Hardland Slopes range site.

Conlen loam, 3 to 5 percent slopes (CoC).—This gently sloping soil is on ridges and breaks along drainageways. Most soil areas are long and narrow and average about 60 acres in size.

The surface layer is brown, calcareous loam about 10 inches thick. The next layer is clay loam that extends to a depth of 60 inches or more. The upper 5 inches of this layer is brown; the next 10 inches is very pale brown and contains soft powdery lime. The lower part is reddish yellow.

Included in mapped areas of this soil are small areas of Berthoud and Plack soils.

Runoff is medium. A moderate hazard of soil blowing and a high hazard of water erosion limit the use of these soils to range or close-growing small grain. Where this soil is cultivated, terracing and contour tillage are needed to reduce water erosion. Crop residues left on the surface help to control soil blowing. A properly designed irrigation system is required to meet the needs of plants and to control loss of water and soil. Capability unit IVe–1, dryland, and IVe–1, irrigated; Hardland Slopes range site.

Corlena Series

The Corlena series is made up of deep, well-drained, calcareous soils on flood plains of the major streams. These soils are nearly level.

In a representative profile, the surface layer is about 10 inches of calcareous loamy fine sand. It is light yellowish brown in the upper part and dark yellowish brown in the lower part. The underlying material is light yellowish-brown, calcareous loamy fine sand that contains thin layers of loamy soils and a few rounded pebbles.

Corlena soils are used for range. Their permeability is rapid, and runoff is slow. The available water capacity is low. A water table is 3 to 10 feet below the surface during wet seasons. These soils flood about once each 1 to 5 years.

Representative profile of Corlena loamy fine sand, in an area of Corlena soils, 0.5 mile northwest of Perico, Tex., by U.S. Highway 87, then 6 miles north and west by county road, and 450 feet east of the road along Rita Blanca Creek.

A11—0 to 5 inches, light yellowish-brown (10YR 6/4) loamy fine sand, dark yellowish brown (10YR 4/4) moist; weak, fine, granular and subangular blocky structure; soft, very friable; stratified; calcareous; moderately alkaline; clear, smooth boundary.

A12—5 to 10 inches, dark yellowish-brown (10YR 4/4) loamy fine sand, dark yellowish brown (10YR 3/4) moist; weak, fine, granular and subangular blocky structure; soft, very friable; few, thin, darker colored, loamy strata; few rounded siliceous pebbles as much as 0.5 inch in diameter; calcareous; moderately alkaline; clear, smooth boundary.

C—10 to 70 inches, light yellowish-brown (10YR 6/4) loamy fine sand, yellowish brown (10YR 5/4) moist; single grained; loose; few thin strata of rounded siliceous pebbles as much as 0.5 inch in diameter; few strata 0.5 to 4 inches in thickness that have textures of loam, sandy loam, and fine sand; calcareous; moderately alkaline.

The upper 40 inches is fine sand or loamy fine sand in texture and contains thin strata of finer textures. The A horizon is 3 to 20 inches thick, and it is very pale brown, pale brown, light yellowish brown, yellowish brown, brown, dark yellowish brown, or light brown. The C horizon is light brown, brown, very pale brown, pale brown, light yellowish brown, or yellowish brown.

Corlena soils (Cr). These nearly level soils are on narrow bottom lands along the major drainageways. Soil areas range from 20 to 340 acres in size. The surface layer is fine sand or loamy fine sand.

Included with mapped areas of these soils are small spots of Dalupe and Humbarger soils on the flood plains and Valentine soils above the flood plains.

These soils are subject to a slight hazard of water erosion and a high hazard of soil blowing. A good cover of grasses helps to control soil blowing. Capability unit Vw–1, dryland; Sandy Bottomland range site.

Dallam Series

The Dallam series is made up of deep, well-drained, nearly level to gently sloping and gently undulating soils.

In a representative profile (fig. 8), the surface layer is brown fine sandy loam about 8 inches thick. The next layer extends to a depth of 94 inches. The upper 24 inches of this layer is yellowish-brown sandy clay loam. The next

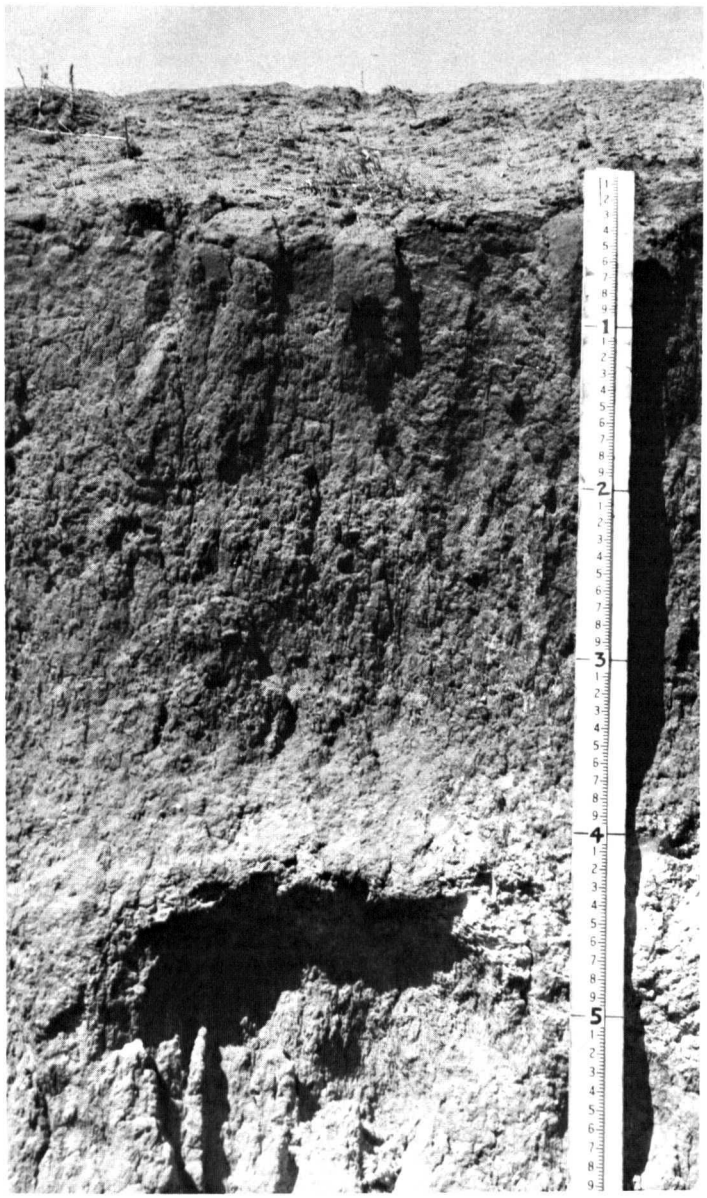

Figure 8.—**Profile of a Dallam fine sandy loam showing a layer of soft powdery lime.**

25 inches is pink sandy clay loam, and the lower 37 inches is reddish-yellow clay loam.

Dallam soils are in crops and range. The main crops are dryfarmed or irrigated wheat and grain sorghum. Some fields are planted to corn. The permeability of these soils is moderate, and runoff is slow. The available water capacity is high.

Representative profile of Dallam fine sandy loam, 0 to 1 percent slopes, 14 miles northwest of Dalhart, Tex., on U.S. Highway 87, then 0.7 mile north on private road, and 700 feet west of road, in range.

A1—0 to 8 inches, brown (10YR 4/3) fine sandy loam, dark brown (10YR 3/3) moist; weak, fine, subangular blocky and granular structure; slightly hard, friable; many fine roots; few worm casts; neutral; clear, smooth boundary.

B21t—8 to 23 inches, yellowish-brown (10YR 5/4) sandy clay loam, dark yellowish brown (10YR 4/4) moist; weak, coarse, prismatic structure parting to weak, fine, subangular blocky; very hard, friable; many fine roots; common pores; few clay films on ped surfaces; mildly alkaline; gradual, smooth boundary.

B22t—23 to 32 inches, yellowish-brown (10YR 5/4) sandy clay loam, dark yellowish brown (10YR 4/4) moist; weak, coarse, prismatic structure parting to weak, fine, subangular blocky; very hard, friable; few fine roots; few clay films on ped surfaces; few films and threads of calcium carbonate; calcareous; moderately alkaline; clear, wavy boundary.

B23tca—32 to 57 inches, pink (7.5YR 7/4) sandy clay loam, light brown (7.5YR 6/4) moist; weak, fine, subangular blocky structure; hard, friable; few clay films on ped surfaces; about 15 percent visible calcium carbonate, mostly in soft masses; calcareous; moderately alkaline; diffuse boundary.

B24t—57 to 94 inches, reddish-yellow (7.5YR 6/6) clay loam, strong brown (7.5YR 5/6) moist; weak, fine, subangular blocky structure; hard, friable; few clay films; about 10 percent visible calcium carbonate in soft masses; calcareous; moderately alkaline.

The solum is more than 80 inches thick. Secondary carbonates are at a depth of 16 to 36 inches.

The A horizon is brown, grayish brown, or yellowish brown in color and is 6 to 12 inches thick. It is fine sandy loam or loamy fine sand in texture.

The B21t and B22t horizons are brown or yellowish brown. The Bt horizons are typically sandy clay loam in texture but range to clay loam that is 22 to 35 percent clay.

The Btca horizon is pink, light brown, or light reddish brown. It is sandy clay loam, clay loam, or silty clay loam in texture. This horizon is 2 to 30 percent calcium carbonate in the form of soft masses or concretions. The B24t horizon is reddish yellow or yellowish red.

Dallam fine sandy loam, 0 to 1 percent slopes (DlA).—This nearly level soil is on broad plains. Soil areas are irregular and average about 100 acres in size.

This soil has the profile described as representative for the Dallam series.

Included with this soil in mapping are areas of Dumas and Gruver loams. These soils are slightly lower in the landscape. Areas of Perico and Rickmore soils also are included.

Practices that help control soil blowing are needed where this soil is cultivated. The hazard of soil blowing is moderate, and the hazard of water erosion is slight. Minimum tillage (fig. 9) or stubble mulching, which leave crop residues on the surface to break the action of the wind, can be used to reduce soil blowing. A properly designed irrigation system is needed to apply water uniformly to irrigated crops. Capability unit IIIe–1, dryland, and IIe–1, irrigated; Sandy Loam range site.

Dallam fine sandy loam, 1 to 3 percent slopes (DlB).—This gently sloping soil is on ridges that are mainly long and narrow and average about 75 acres in size.

In a representative profile, the surface layer is brown fine sandy loam about 7 inches thick. The next layer is yellowish-brown sandy clay loam in the upper 32 inches, light-brown clay loam containing soft powdery lime in the next 15 inches, and reddish-yellow clay loam below a depth of 54 inches.

Included with this soil in mapping are small areas of Dumas and Perico soils.

The hazards of soil blowing and water erosion are moderate, and are the main considerations where this Dallam fine sandy loam is cultivated. Crop residues kept on the surface help control soil blowing. Terracing and contour

Figure 9.—**Corn planted without tillage on a Dallam fine sandy loam. Residue from the previous crop is left undisturbed.**

farming are needed to slow runoff and to reduce water erosion. A properly designed irrigation system is needed for uniform application of water where irrigated crops are grown. Capability unit IIIe–1, dryland, and IIIe–1, irrigated; Sandy Loam range site.

Dallam loamy fine sand, 0 to 3 percent slopes (DaB).—This nearly level to gently sloping and gently undulating soil is on plains. Soil areas are broad and average about 800 acres in size.

In a representative profile, the surface layer is brown loamy fine sand about 12 inches thick. The next layer is brown sandy clay loam to clay loam in the upper 23 inches; pink clay loam that contains soft powdery lime in the next 12 inches; and reddish-yellow, calcareous clay loam below a depth of 47 inches.

Included with this soil in mapping are small areas of Perico and Vingo soils.

The hazard of soil blowing is high, and the hazard of water erosion is slight on this Dallam loamy fine sand. Controlling soil blowing is important where this soil is cultivated. Crop residues kept on the surface break the force of the wind and reduce soil blowing. A properly designed irrigation system is needed where irrigated crops are grown. Capability unit IVe–2, dryland, and IIIe–2, irrigated; Sandyland range site.

Dalupe Series

The Dalupe series consists of deep, calcareous soils on flood plains of the major streams. These soils are nearly level and well drained.

In a representative profile, the surface layer is about 10 inches of brown, calcareous fine sandy loam. The next layer is about 27 inches of pale-brown, calcareous fine sandy loam that contains thin strata of loamy soil. The underlying material, extending to a depth of 60 inches, is brown, calcareous fine sandy loam that contains thin strata of other textures.

Dalupe soils are moderately rapidly permeable, and their runoff is slow. The available water capacity is high. These soils flood about once each 1 to 5 years, but they are covered by water only a short time.

Dalupe soils are mainly in range, but a small acreage is cultivated. The main crops are dry and irrigated wheat, grain sorghum, and alfalfa.

Representative profile of Dalupe fine sandy loam, 9 miles northwest of Dalhart, Tex., on U.S. Highway 87 to the north side of Rita Blanca Creek, then 150 feet east of highway right-of-way, and 300 feet north of creek.

A11—0 to 4 inches, brown (10YR 5/3) fine sandy loam, brown (10YR 4/3) moist; weak, fine, granular structure; slightly hard, friable; many roots; few strata, less than 0.25 inch thick, of darker colored soil; calcareous; moderately alkaline; abrupt, smooth boundary.

A12—4 to 10 inches, brown (10YR 4/3) fine sandy loam, dark brown (10YR 3/3) moist; weak, fine, granular structure; soft, very friable; common fine roots; few thin strata of lighter colored sandy loam less than 0.5 inch thick; calcareous; moderately alkaline; abrupt, smooth boundary.

B—10 to 37 inches, pale-brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; weak, fine, subangular blocky and granular structure; soft, very friable; few roots; many fine pores; common worm casts; few thin strata of darker colored loamy soil; few films and threads of calcium carbonate on ped surfaces; calcareous; moderately alkaline; clear, smooth boundary.

C—37 to 60 inches, brown (7.5YR 5/4) fine sandy loam, dark brown (7.5YR 4/4) moist; massive; soft, very friable; many thin strata of loam, sandy clay loam, and loamy sand materials; calcareous; moderately alkaline.

The solum ranges from 30 to 58 inches in thickness. Between depths of 10 and 40 inches, the soil is 8 to 18 percent clay. The A horizon is light brown, brown, pale brown, light yellowish brown, yellowish brown, grayish brown, or dark grayish brown.

The B horizon is light brown, brown, pale brown, light yellowish brown, grayish brown, or yellowish brown. This horizon is fine sandy loam that contains thin strata of darker and lighter colored loam and loamy sand. It is 0 to 5 percent visible calcium carbonate.

The C horizon is brown, yellowish brown, or dark yellowish brown. This horizon is fine sandy loam or loamy sand that contains many strata of loam, sandy clay loam, and clay loam.

Dalupe fine sandy loam (Df).—This nearly level soil is on the narrow flood plains of the major streams in areas 10 to about 100 acres in size.

Included with this soil in mapping are small areas of Berthoud, Corlena, and Humbarger soils.

The hazard of soil blowing is moderate, and the hazard of water erosion is slight on this Dalupe fine sandy loam. Crop residue kept on the surface helps to control soil blowing, the main management concern where this soil is cultivated. A properly designed irrigation system is needed for uniform application of water to irrigated crops. Capability unit IIIe–2, dryland, and IIe–3, irrigated; Bottomland range site.

Dumas Series

The Dumas series made up of deep, well-drained soils. These soils are neutral and nearly level to gently sloping.

In a representative profile, the surface layer is about 6 inches of dark-brown loam. The next layer extends to a depth of 104 inches. The upper 18 inches is dark-brown to dark yellowish-brown clay loam, the next 36 inches is brown clay loam, the next lower 18 inches is strong-brown sandy clay loam, and the lower 26 inches is reddish-yellow clay loam.

Dumas soils are moderately permeable, and their runoff is slow. The available water capacity is high.

Dumas soils are used for both crops and range. The main crops are dry and irrigated wheat and grain sorghum. Some areas are planted to corn.

Representative profile of Dumas loam, 0 to 1 percent slopes, 12 miles south of Conlen, Tex., on Farm Road 807, then 1.5 miles east on Farm Road 297, and 0.9 mile north, in range.

A1—0 to 6 inches, dark-brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; weak, fine, granular structure; slightly hard, friable; many roots; common pores; neutral; clear, smooth boundary.

B21t—6 to 16 inches, dark-brown (7.5YR 4/2) clay loam, dark brown (7.5YR 3/2) moist; weak, coarse, prismatic structure parting to moderate, medium, subangular blocky; hard, friable; few fine roots and pores; many worm casts; few clay films on ped surfaces; mildly alkaline; gradual, smooth boundary.

B22t—16 to 24 inches, dark yellowish-brown (10YR 4/4) clay loam, dark yellowish brown (10YR 3/4) moist; weak, coarse, prismatic structure parting to moderate, medium and fine, subangular blocky; hard, friable; few clay films; calcareous; moderately alkaline; gradual, wavy boundary.

B23t—24 to 36 inches, brown (7.5YR 5/4) clay loam, brown (7.5YR 4/4) moist; weak, medium, subangular blocky structure; hard, friable; few clay films; calcareous; moderately alkaline; gradual, wavy boundary.

B24tca—36 to 60 inches, brown (7.5YR 5/4) clay loam, brown (7.5YR 4/4) moist; weak, fine, subangular blocky structure; hard, friable; 15 to 20 percent visible calcium carbonate as soft masses; few clay films; calcareous; moderately alkaline; gradual, wavy boundary.

B25t—60 to 78 inches, strong-brown (7.5YR 5/6) sandy clay loam, strong brown (7.5YR 4/6) moist; weak, fine, subangular blocky structure; hard, friable; few clay films; few films of calcium carbonate; calcareous; moderately alkaline; gradual, smooth boundary.

B26t—78 to 104 inches, reddish-yellow (7.5YR 6/6) clay loam, strong brown (7.5YR 5/6) moist; weak, fine, subangular blocky structure; hard, friable; few clay films; 15 to 20 percent visible calcium carbonate as soft masses; calcareous; moderately alkaline.

The solum is more than 90 inches thick. Secondary carbonates are at a depth of 15 to 34 inches.

The A horizon is 6 to 12 inches thick and brown, grayish brown, dark brown, or dark grayish brown. This horizon is neutral or mildly alkaline in reaction.

The Bt horizon is clay loam or sandy clay loam and is 22 to 35 percent clay. The upper part of the Bt horizon is brown, grayish brown, dark grayish brown, yellowish brown, or dark yellowish brown. The Btca horizon is pink, light reddish brown, light brown, reddish brown, or brown. This horizon is 5 to 40 percent calcium carbonate. The lower part of the Bt horizon is reddish yellow, yellowish red, or strong brown.

Dumas loam, 0 to 1 percent slopes (DuA).—This nearly level soil is on broad plains in irregular areas that average about 120 acres in size.

This soil has the profile described as representative for the Dumas series.

Included with this soil in mapping are small areas of Dallam, Gruver, Sherm, and Sunray soils. A few soils are included that are like the Dumas soils but have soft powdery lime about 20 inches below the surface.

The hazard of soil blowing is moderate, and the hazard of water erosion is slight on this Dumas loam. Crop residue kept on the surface helps to control soil blowing and to improve tilth, the main concerns where this soil is cultivated. A properly designed irrigation system is needed for uniform application of water to irrigated crops. Capability unit IIIe–3, dryland, and IIe–2, irrigated; Deep Hardland range site.

Dumas loam, 1 to 3 percent slopes (DuB).—This gently sloping soil is on long narrow ridges that average about 40 acres in size.

In a representative profile, the surface layer is brown loam about 12 inches thick. The next layer is grayish-brown clay loam in the upper 10 inches; yellowish-brown, calcareous clay loam in the next 17 inches; reddish-brown clay loam that contains soft powdery lime in the next 18 inches; and reddish-yellow, calcareous clay loam below a depth of 57 inches.

Included with this soil in mapping are small areas of Conlen, Dallam, Gruver, and Sunray soils.

The hazards of soil blowing and water erosion are moderate. Crop residues kept on the surface help to control soil blowing. Terraces and contour farming slow runoff and help to control water erosion. A properly designed irrigation system is needed for uniform water application on irrigated crops. Capability unit IIIe–3, dryland, and IIIe–4, irrigated; Deep Hardland range site.

Gruver Series

The Gruver series is made up of deep, well-drained, neutral soils. These soils are nearly level to gently sloping.

In a representative profile, the surface layer is about 7 inches of dark grayish-brown, neutral loam. The next layer is clay loam to a depth of 72 inches. The upper 9 inches is dark grayish brown, the next 12 inches is light yellowish brown, the next 12 inches is pink, and the lower 32 inches is light brown. Between depths of 72 and 92 inches is reddish-yellow sandy clay loam.

Gruver soils are moderately slowly permeable, and their runoff is slow. The available water capacity is high.

Most Gruver soils are in crops, but a few areas are in range. The main crops are irrigated wheat and grain sorghum. Some other irrigated and nonirrigated crops, such as alfalfa and corn, are grown.

Representative profile of Gruver loam, 0 to 1 percent slopes, about 15 miles east of Dalhart, Tex., on Farm Road 297, then 0.25 mile east on Farm Road 807 from its intersection with Farm Road 297, and 0.5 mile north of the right-of-way, in cropland.

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak, medium, granular and subangular blocky structure; hard, friable; neutral; abrupt, smooth boundary.

B21t—7 to 16 inches, dark grayish-brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium, subangular blocky structure; very hard, firm; many fine roots; many fine pores; few clay films; neutral; gradual, smooth boundary.

B22t—16 to 28 inches, light yellowish-brown (10YR 6/4) clay loam, yellowish brown (10YR 5/4) moist; moderate, medium, subangular blocky structure; very hard, firm; few fine roots; few fine pores; few clay films on ped surfaces; few visible calcium carbonate films and threads; calcareous; moderately alkaline; gradual, wavy boundary.

B23tca—28 to 40 inches, pink (7.5YR 7/4) clay loam, light brown (7.5YR 6/4) moist; weak, medium, subangular blocky structure; very hard, very firm; few clay films; estimated 20 percent calcium carbonate as soft masses and weakly cemented concretions; calcareous; moderately alkaline; gradual, wavy boundary.

B24t—40 to 72 inches, light-brown (7.5YR 6/4) clay loam, brown (7.5YR 5/4) moist; moderate, medium, subangular blocky structure; hard, firm; few clay films; estimated 10 percent visible calcium carbonate in form of soft masses; calcareous; moderately alkaline; gradual, wavy boundary.

B25t—72 to 92 inches, reddish-yellow (7.5YR 6/6) sandy clay loam, strong brown (7.5YR 5/6) moist; moderate, medium, subangular blocky structure; hard, friable; few clay films; estimated 10 percent visible calcium carbonate in form of soft masses; calcareous; moderately alkaline.

The solum is more than 80 inches thick. Secondary carbonates are at a depth of 14 to 18 inches. The A horizon is brown, grayish brown, or dark grayish brown and 6 to 10 inches thick. The B21t horizon is brown, grayish brown, or dark grayish brown. The B22t horizon is brown or light yellowish brown. The B21t and B22t horizons are clay loam or silty clay loam and are 35 to 40 percent clay. The Btca horizon is pink, light brown, or grayish brown. This horizon is clay loam or silty clay loam and is 20 to 35 percent visible calcium carbonate. The B24t horizon is light brown or reddish yellow. The B25t horizon is reddish yellow to light brown.

Gruver loam, 0 to 1 percent slopes (GrA).—This nearly level soil is on broad plains and benches above the playas. Soil areas are smooth and average about 160 acres in size.

This soil has the profile described as representative for the Gruver series.

Included with this soil in mapping are small areas of Dumas, Sherm, Sunray, and Texline soils.

The hazard of soil blowing is moderate, and the hazard of water erosion is slight on this Gruver loam. It is important to control soil blowing and maintain tilth where this soil is cultivated. Stubble mulching, minimum tillage, and other practices that keep crop residue on the surface help to control soil blowing and also help to maintain good tilth. A properly designed irrigation system is needed for uniform application of water to irrigated crops. Capability unit IIIe–3, dryland, and IIe–2, irrigated; Deep Hardland range site.

Gruver loam, 1 to 3 percent slopes (GrB).—This gently sloping soil is on ridges and breaks within larger areas of nearly level soils. Soil areas are long and narrow and average about 30 acres in size.

In a representative profile, the surface layer is brown loam about 6 inches thick. The next layer is brown clay loam in the upper 25 inches, pink clay loam in the next 12 inches, and reddish-yellow clay loam in the next 30 inches. Below a depth of 73 inches is reddish-yellow sandy clay loam.

Included with this soil in mapping are small areas of Dumas soils, less sloping Gruver soils, and Sunray soils.

The hazards of soil blowing and water erosion are moderate. Controlling these hazards is important where this Gruver loam is cultivated. Terracing and contour farming are needed to control water erosion. Crop residue kept on the surface helps to control soil blowing. A properly designed irrigation system is needed for uniform water application on irrigated crops. Capability unit IIIe–3, dryland, and IIIe–4, irrigated; Deep Hardland range site.

Humbarger Series

The Humbarger series consists of deep, well-drained calcareous soils. These nearly level soils are along major streams on bottom lands.

In a representative profile, the surface layer is dark grayish brown and about 24 inches thick. It is calcareous loam in the upper 8 inches and calcareous clay loam in the lower 16 inches. Below this, and to a depth of 65 inches, is calcareous sandy clay loam that is dark grayish brown in the upper part and brown in the lower part.

Humbarger soils are moderately permeable, and their runoff is slow. The available water capacity is high. These soils flood once in 1 to 5 years, but are covered only for short periods.

Humbarger soils are mostly in range, but a small acreage is planted to irrigated wheat, grain sorghum, and alfalfa.

Representative profile of Humbarger loam, 10.8 miles south of Texline, Tex., on Farm Road 296, then 300 feet east of right-of-way, and 300 feet north of Carrizo Creek.

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak, fine, granular and subangular blocky structure; soft, friable; few fine roots; calcareous; moderately alkaline; abrupt, smooth boundary.

A1—8 to 24 inches, dark grayish-brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; weak, coarse, prismatic structure parting to weak, fine, granular and subangular blocky; hard, friable; common fine roots; many worm casts; calcareous; moderately alkaline; gradual, smooth boundary.

C1—24 to 48 inches, dark grayish-brown (10YR 4/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; massive; soft, friable; few thin strata of sandy loam and loam; calcareous; moderately alkaline; gradual, smooth boundary.

C2—48 to 65 inches, brown (10YR 4/3) sandy clay loam, dark brown (10YR 3/3) moist; massive; soft, friable; few thin strata of sandy loam; calcareous; moderately alkaline.

The A horizon is 22 to 45 inches thick and dark grayish brown, grayish brown, dark brown, or brown. This horizon is 18 to 32 percent clay and has thin strata of other textures below a depth of 20 inches. The C horizon is dark grayish brown, brown, dark yellowish brown, yellowish brown, or pale brown.

Humbarger loam (Hu).—This deep, nearly level soil is on bottom lands along the major streams. Most areas are long and narrow and average about 270 acres in size.

Included with this soil in mapping are isolated areas of Dalupe and Sunray soils. Also included are soils like the Humbarger that do not have dark colors below a depth of 20 inches.

The hazard of soil blowing is moderate, and the hazard of water erosion is slight on this Humbarger loam. Minimum tillage and other practices that help to keep crop residues on the surface are needed to control soil blowing and improve tilth. A properly designed irrigation system is needed for uniform application of water where crops are irrigated. Capability unit IIe–1, dryland, and IIe–3, irrigated; Bottomland range site.

Kerrick Series

The Kerrick series is made up of moderately deep, well-drained, calcareous soils. These nearly level soils are on uplands. Kerrick soils occur in association with Plack soils and are not mapped separately.

In a representative profile, the surface layer is dark grayish-brown, calcareous loam about 10 inches thick. The next layer is light brownish-gray, calcareous clay loam in the upper 6 inches and brown, calcareous clay loam that contains soft powdery lime and hard concretions in the lower 15 inches. A thick layer of very pale brown, indurated, platy caliche is about 31 inches below the surface.

Kerrick soils are moderately permeable, and their runoff is slow. The available water capacity is moderate. All of this soil is in range.

Representative profile of Kerrick loam, in an area of Kerrick-Plack association, nearly level, 13 miles east of Texline, Tex., on Farm Road 296, then 5.5 miles east of intersection of Farm Road 296 and Farm Road 1879 on a county road, and 2 miles south into pasture on Rita Blanca National Grassland.

A1—0 to 10 inches, dark grayish-brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak, fine, granular structure; slightly hard, friable; many roots; common worm casts; few calcium carbonate concretions as much as 5 millimeters in diameter; calcareous; moderately alkaline; gradual, smooth boundary.

B2—10 to 16 inches, light brownish-gray (10YR 6/2) clay loam, grayish brown (10YR 5/2) moist; weak, coarse, prismatic structure parting to weak, fine, subangular blocky; hard, friable; few roots; few fine pores, many worm casts; 10 percent visible calcium carbonate as soft masses and fine concretions; calcareous; moderately alkaline; clear, wavy boundary.

B2ca—16 to 31 inches, brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/4) moist; weak, medium, granular structure; hard, very friable; common white (10YR 8/2) coating of calcium carbonate on ped surfaces, about 40 percent visible calcium carbonate as soft masses and concretions; calcareous; moderately alkaline; clear, wavy boundary.

Ccam—31 to 60 inches, very pale brown (10YR 7/3), indurated, platy caliche; laminar in the upper 0.5 inch and strongly cemented below, plates are 1 to 4 inches thick; hardness of caliche about 4 on Mohs' scale.

The solum is 21 to 40 inches thick to hardened caliche. The A horizon is 8 to 14 inches thick and is brown, grayish brown, or dark grayish brown. This horizon is loam or clay loam in texture.

The B2 horizon is 5 to 9 inches thick and is light brown, brown, grayish brown, light brownish gray, pale brown, light yellowish brown, or yellowish brown. This horizon is loam or clay loam in texture, and the clay content is 18 to 35 percent.

The B2ca horizon is 5 to 21 inches thick and is brown or pale brown. This horizon is clay loam or silty clay loam in texture and is 10 to 50 percent visible calcium carbonate.

The Ccam horizon has a platy upper layer that is 0.5 to 3 inches thick. This horizon has a hardness of 3 to 5 on the Mohs' scale.

Kerrick-Plack association, nearly level (Kp).—This mapping unit consists of nearly level soils on plains and low ridges. Soil areas are broad and average about 600 acres in size. Slopes average 0.5 percent.

Delineations are much larger, and the composition of these units is more variable, than for most other mapping units in the county. Mapping has been controlled well enough, however, for the anticipated use of the soils.

Kerrick loam makes up about 50 percent of the mapping unit, Plack loam about 40 percent, and other soils the remaining 10 percent. Kerrick loam is in the lower, more nearly level areas. Plack loam is mainly on small ridges and knolls that are 1 to 2 feet higher than the surrounding Kerrick loam.

This Kerrick loam has the profile described as representative for the Kerrick series.

A representative profile of Plack loam has a dark grayish-brown, calcareous loam surface layer about 6 inches thick. The surface layer rests abruptly on indurated platy caliche. Included in this mapping unit are areas of Conlen and Sunray soils.

This mapping unit is not well suited to cultivation; all of it is in range. The hazard of soil blowing is moderate, and the hazard of water erosion is slight. A good cover of grass is needed to control soil blowing. Dryland capability unit IVe–5, Kerrick part and VIIs–1, Plack part; Irrigated capability unit IVe–4, Kerrick part, and Plack part not assigned; Hardland Slopes range site, Kerrick part; Very Shallow range site, Plack part.

Ness Series

The Ness series consists of deep, poorly drained, mildly alkaline soils that are nearly level. Those soils are on the floors of playas and in other enclosed depressions.

In a representative profile, the surface layer is dark-gray clay about 30 inches thick. Below this is dark-gray, calcareous clay.

Ness soils are very slowly permeable, and runoff is ponded. When these soils are dry, deep cracks form. These soils are flooded for a few weeks to several months each year.

Most areas of the Ness soils are used for range. The vegetation is sparse because these soils are flooded after rains. Some of the smaller playas are planted to dry and irrigated crops of wheat and grain sorghum. The larger playas are mostly in native grasses.

Representative profile of Ness clay, 3.8 miles south of Kerrick, Tex., on U.S. Highway 287, then 0.5 mile west of highway in range.

A11—0 to 14 inches, dark-gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; strong, coarse, blocky structure; extremely hard, very firm; few faint mottles of light brown (7.5YR 6/4) on ped surfaces; mildly alkaline; clear, smooth boundary.

A12—14 to 30 inches, dark-gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; strong, coarse, blocky structure; extremely hard, very firm; few shiny pressure faces on ped surfaces; mildly alkaline; gradual, smooth boundary.

C—30 to 65 inches, dark-gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; massive; extremely hard, very firm; few weakly cemented calcium carbonate concretions as much as 5 millimeters in diameter; few brown (7.5YR 5/6) mottles; calcareous; moderately alkaline.

The solum is 20 to 50 inches thick, and free carbonates are at a depth of 24 to 37 inches. Between depths of 10 and 40 inches the texture is clay, and the soil is more than 40 percent clay. The A horizon is dark gray or gray. The C horizon is dark gray, dark grayish brown, gray, or grayish brown. This horizon is from 0 to 5 percent visible calcium carbonate.

Ness clay (Ne).—This nearly level soil is on the floors of playas and enclosed depressions on the High Plains. Soil areas are rounded and average about 65 acres in size.

Included with this soil in mapping are areas of Church soils. Some soils like the Ness are included, but they have a grayish-brown surface layer.

Only a small acreage of this soil is farmed, and those are where it is adjacent to other soils. The hazard of soil blowing is high, and the hazard of water erosion is slight. A good cover of grass or crop residue is needed to control soil blowing. Capability unit VIw–1, dryland; included in surrounding range sites.

Perico Series

The Perico series consists of deep, calcareous, well-drained soils that are nearly level and gently sloping or gently undulating.

In a representative profile, the surface layer is brown, calcareous fine sandy loam about 7 inches thick. The next layer extends to a depth of 88 inches. It is brown to light-brown sandy clay loam in the upper 36 inches, yellowish-brown sandy clay loam in the next 26 inches, and reddish-yellow clay loam below.

Perico soils are moderately permeable, and runoff is slow. The available water capacity is high. The lime content of these soils causes chlorosis in some plants.

These Perico soils are used mainly for range. Some areas are planted to dry and irrigated crops of wheat, grain sorghum, and alfalfa. Most irrigation is by the sprinkler method.

Representative profile of Perico fine sandy loam, 1 to 3 percent slopes, 6 miles northeast of Dalhart, Tex., on U.S. Highway 54, then 150 feet south of right-of-way in a cultivated field.

Ap—0 to 7 inches, brown (7.5YR 5/4) fine sandy loam, dark brown (7.5YR 4/4) moist; weak, fine, granular structure; slightly hard, friable; few very fine concretions of calcium carbonate; calcareous; moderately alkaline; abrupt, smooth boundary.

B21t—7 to 23 inches, brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 4/4) moist; weak, coarse, prismatic structure parting to weak, medium, subangular blocky; slightly hard, friable; many fine pores; few worm casts; few clay films; few films and threads of calcium carbonate on ped surfaces; calcareous; moderately alkaline; clear, wavy boundary.

B22tca—23 to 31 inches, light-brown (7.5YR 6/4) sandy clay loam, brown (7.5YR 5/4) moist; weak, coarse, prismatic structure parting to weak, medium, subangular blocky; slightly hard, friable; few fine roots; common, fine and medium pores; few clay films; estimated 5 percent visible calcium carbonate films and threads on ped surfaces; calcareous; moderately alkaline; gradual, smooth boundary.

B23t—31 to 43 inches, brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 4/4) moist; weak, coarse, prismatic structure parting to weak, medium, subangular blocky; slightly hard, friable; common, fine and medium pores; few clay films; few films and threads of calcium carbonate on ped surfaces; calcareous; moderately alkaline; gradual, smooth boundary.

B24t—43 to 69 inches, yellowish-brown (10YR 5/4) sandy clay loam, dark yellowish brown (10YR 4/4) moist; weak, coarse, prismatic structure parting to weak, medium, subangular blocky; soft, very friable; few pores; few clay films; few films and threads of calcium carbonate; calcareous; moderately alkaline; gradual, smooth boundary.

B25t—69 to 88 inches, reddish-yellow (7.5YR 6/6) clay loam, strong brown (7.5YR 5/6) moist; weak, medium, subangular blocky structure; slightly hard, friable; few clay films; estimated 5 percent visible calcium carbonate as films, threads, and strongly cemented concretions; calcareous; moderately alkaline.

The solum is more than 60 inches thick. The A horizon is 4 to 15 inches thick and is light brown, brown, pale brown, grayish brown, or yellowish brown. This horizon is fine sandy loam or loamy fine sand in texture.

The Bt horizon is yellowish brown, light brown, brown, reddish yellow, strong brown, or yellowish red. This horizon is sandy clay loam or clay loam and is 18 to 33 percent clay. The Btca horizon is 3 to 15 percent visible calcium carbonate.

Perico fine sandy loam, 0 to 1 percent slopes (PeA).—This nearly level soil is mainly in subrounded areas that average about 120 acres in size.

In a representative profile, the surface layer is brown, calcareous fine sandy loam about 8 inches thick. The next layer is yellowish-brown sandy clay loam in the upper 10 inches, light-brown clay loam in the next 6 inches, and brown sandy clay loam between depths of 24 and 51 inches. Below this it is reddish-yellow clay loam.

Included with this soil in mapping are small areas of Dallam, Spurlock, and Sunray soils.

The hazard of soil blowing is moderate, and the hazard of water erosion is slight on this Perico fine sandy loam. Keeping crop residue on the surface helps to control soil blowing and improve tilth, the main concerns where this soil is cultivated. A properly designed irrigation system is needed for uniform application of water to irrigated crops. Capability unit IIIe–7, dryland, and IIIe–3, irrigated; Mixedland Slopes range sites.

Perico fine sandy loam, 1 to 3 percent slopes (PeB).—This gently sloping soil is on ridges that are long and narrow and average 90 acres in size.

This soil has the profile described as representative for the Perico series. Included with this soil in mapping are areas of Dallam, Spurlock, and Sunray soils.

The hazards of soil blowing and water erosion are moderate on this Perico fine sandy loam. Minimum tillage and stubble mulching keep crop residues on the surface and reduce soil blowing and help improve tilth, the two main concerns where this soil is cultivated. Terracing and contour farming help reduce runoff and control water erosion. A properly designed irrigation system is needed for uniform application of water on irrigated crops. Capability unit IIIe–7, dryland, and IIIe–3, irrigated; Mixedland Slopes range site.

Perico fine sandy loam, 3 to 5 percent slopes (PeC).—This gently sloping soil is on ridges and breaks along drainageways. Soil areas are mainly long and narrow and average about 70 acres in size.

In a representative profile, the surface layer is pale-brown, calcareous fine sandy loam about 5 inches thick. The next layer is brown clay loam in the upper 17 inches, light-brown sandy clay loam in the next 19 inches, and reddish-yellow clay loam below a depth of 41 inches.

Included with this soil in mapping are small areas of Berthoud and Spurlock soils. Other Perico soils are in less sloping areas near the outer edge of areas of this soil.

The hazard of soil blowing is moderate, and the hazard of water erosion is high on this Perico fine sandy loam. Terraces and contour farming are needed to reduce runoff and to control water erosion where this soil is cultivated. Crop residues kept on the surface reduce soil blowing. A properly designed irrigation system is needed for uniform application of water to irrigated crops. Capability unit IVe–3, dryland, and IVe–2, irrigated; Mixedland Slopes range site.

Perico loamy fine sand, 0 to 3 percent slopes (PcB).—This nearly level to gently sloping and gently undulating soil is in smooth areas that are longer than they are wide. Soil areas average about 80 acres in size.

In a representative profile, the surface layer is brown, calcareous loamy fine sand about 9 inches thick. The next layer is yellowish-brown sandy clay loam in the upper 11 inches, brown sandy clay loam in the next 9 inches, and yellowish-brown sandy clay loam between depths of 29 and 64 inches. Below this, it is reddish-yellow clay loam.

Included with this soil in mapping are areas of Dallam and Vingo soils. Areas of Perico fine sandy loam also are included.

This Perico loamy fine sand is subject to a high hazard of soil blowing and a slight hazard of water erosion. Crop residues kept on the surface help to control soil blowing where this soil is cultivated. A properly designed irrigation system is needed for uniform application of water to irrigated crops. Capability unit IVe–2, dryland, and IIIe–2, irrigated; Sandyland range site.

Plack Series

The Plack series consists of very shallow and shallow, calcareous soils over indurated caliche. These nearly level to gently sloping soils are well drained and are on ridges and breaks along drainageways.

In a representative profile, the surface layer is grayish-brown, calcareous loam about 8 inches thick. The surface layer rests abruptly on indurated, platy caliche.

Plack soils have a moderately permeable surface layer and are very slowly permeable below. Available water capacity is low. Runoff is medium to rapid.

All of these Plack soils are in range. Vegetation is sparse.

Representative profile of Plack loam, 0 to 3 percent slopes, 13 miles east of Texline, Tex., on Farm Road 296, then 6 miles east of the intersection of Farm Road 296 and Farm Road 1879 on a county road, and 1.5 miles north of road in pasture on the Rita Blanca National Grassland.

A1—0 to 8 inches, grayish-brown (10YR 5/2) loam, very dark grayish brown (10YR 3/) moist; weak, fine, granular and subangular blocky structure; slightly hard, friable; many fine roots; few, fine, strongly cemented concretions of calcium carbonate as much as 5 millimeters in diameter; calcareous; moderately alkaline; abrupt, smooth boundary.

Ccam—8 to 50 inches, white (10YR 8/2), indurated, platy caliche; laminar in the upper 0.5 inch and strongly cemented below; plates 1 to 4 inches thick; hardness of about 4 on Mohs' scale.

The solum is 4 to 20 inches thick to indurated caliche. The A horizon is brown, dark grayish brown, or grayish brown. This horizon is loam or clay loam in texture. The Ccam horizon has a laminar upper surface that ranges from 0.5 inch to 3 inches in thickness. Caliche plates are 1 to 6 inches thick.

Plack loam, 0 to 3 percent slopes (PlB).—This nearly level to gently sloping soil is on low ridges and breaks above drainageways. This soil commonly is on the highest part of the landscape. Soil areas are long and narrow and average about 130 acres in size.

Included with this soil in mapping are areas of Conlen and Kerrick soils.

This Plack loam is used for range. It is subject to a moderate hazard of soil blowing and a slight hazard of water erosion. A good cover of grass is needed to control soil blowing. Capability unit VIIs–1, dryland; Very Shallow range site.

Rickmore Series

The Rickmore series consists of deep, well-drained, neutral soils that are nearly level to gently sloping.

In a representative profile, the surface layer is dark yellowish-brown fine sandy loam about 8 inches thick. The next layer is mainly clay loam to a depth of 90 inches. The upper 52 inches is brown, and the lower part is reddish yellow.

Rickmore soils are moderately slowly permeable, and runoff is slow. Their available water capacity is high. Most of the fine sandy loam areas are in crops, mainly dryfarmed and irrigated wheat and grain sorghum. Most of the loamy fine sand areas are in range.

Representative profile of Rickmore fine sandy loam, 0 to 1 percent slopes, 5 miles south of the intersection of Farm Road 807 and U.S. Highway 54 in Conlen, Tex., then 100 feet east of Farm Road 807 right-of-way in cropland.

Ap—0 to 8 inches, dark yellowish-brown (10YR 4/4) fine sandy loam, dark yellowish brown (10YR 3/4) moist; weak, medium, granular structure; slightly hard, friable, neutral; abrupt, smooth boundary.

B1—8 to 12 inches, brown (10YR 4/3) sandy clay loam, dark brown (10YR 3/3) moist; weak, medium, subangular blocky structure; hard, friable, slightly sticky; few fine roots; few fine and medium pores; common worm casts; neutral; clear, smooth boundary.

B21t—12 to 32 inches, brown (7.5YR 4/2) clay loam, dark brown (7.5YR 3/2) moist; moderate, medium, subangular blocky structure; hard, firm, sticky; few clay films; few fine pores; few worm casts; mildly alkaline; gradual, smooth boundary.

B22t—32 to 38 inches, brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/4) moist; moderate, medium, subangular blocky structure; hard, firm, sticky; few clay films; calcareous; moderately alkaline; gradual, wavy boundary.

B23tca—38 to 60 inches, brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/4) moist; moderate, medium, subangular blocky structure; hard, friable, slightly sticky; few clay films; estimated 5 percent accumulations of carbonate in soft powdery masses and threads; calcareous; moderately alkaline; gradual, wavy boundary.

B24tca—60 to 90 inches, reddish-yellow (7.5YR 7/6) clay loam, reddish yellow (7.5YR 6/6) moist; weak, medium, subangular blocky structure; hard, friable, slightly sticky; few clay films; about 25 percent carbonate in soft powdery masses; calcareous; moderately alkaline.

The solum is more than 60 inches thick. Free carbonates are from 20 to 36 inches below the surface. The A horizon is 4 to 10 inches thick and is brown, yellowish brown, or dark yellowish brown. This horizon is fine sandy loam or loamy fine sand in texture.

The Btca horizon is 30 to 60 inches below the surface. The Bt horizon above the ca horizon is dark grayish brown, grayish brown, or brown. The Bt horizon is clay loam that has a clay content of 35 to 45 percent. The Btca horizon is pink, light reddish brown, reddish brown, light brown, brown, reddish yellow, or yellowish red. This horizon is from 5 to 40 percent carbonates, mostly in soft powdery form.

Rickmore fine sandy loam, 0 to 1 percent slopes (RkA).—This nearly level soil is in broad areas that average about 80 acres in size. The areas are mainly smooth and subrounded.

This soil has the profile described as representative for the Rickmore series.

Included with this soil in mapping are areas of Dallam, Dumas, and Gruver soils.

The hazard of soil blowing is moderate, and the hazard of water erosion is slight on this Rickmore fine sandy loam. Crop residues kept on the surface reduce soil blowing and help maintain tilth, the two main concerns where this soil is cultivated. A properly designed irrigation system is needed for uniform application of water to irrigated crops. Capability unit IIIe–4, dryland, and IIe–4, irrigated; Sandy Loam range site.

Rickmore loamy fine sand, 0 to 3 percent slopes (RcB).—This nearly level to gently sloping soil is on broad, smooth areas that commonly are about 200 acres in size.

In a representative profile, the surface layer is brown loamy fine sand about 10 inches thick. The next layer is brown clay loam in the upper 21 inches, light-brown clay loam in the next 24 inches, and reddish-yellow clay loam below a depth of 55 inches.

Included with this soil in mapping are areas of Dallam and Perico soils.

The hazard of soil blowing is high, and the hazard of water erosion is slight on this Rickmore loamy fine sand. Crop residues kept on the surface reduce soil blowing and improve soil tilth, the two main concerns where this soil is cultivated. A properly designed irrigation system is needed for uniform application of water to irrigated crops. Capability unit IVe–2, dryland, and IIIe–2, irrigated; Sandyland range site.

Sherm Series

The Sherm series consists of deep, well-drained, neutral soils that are nearly level.

In a representative profile, the surface layer is dark grayish-brown clay loam about 10 inches thick. The next layer is brown clay in the upper 50 inches. Below this, it is pink clay loam to a depth of 78 inches and reddish-yellow clay loam below that depth (fig. 10).

Sherm soils are very slowly permeable, and runoff is slow. Their available water capacity is high. These soils are mainly in crops, but a few areas are in range. The main crops are dry farmed and irrigated wheat and grain sorghum.

Representative profile of Sherm clay loam, about 5.5 miles northeast of Dalhart, Tex., on U.S. Highway 54, then 2.3 miles east on Farm Road 695, then 0.3 mile east on a county road, and 100 feet south of road.

A1—0 to 10 inches, dark grayish-brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; weak, medium and coarse, subangular blocky structure; hard, friable; neutral; abrupt, smooth boundary.

B21t—10 to 15 inches, brown (10YR 4/3) clay, dark brown (10YR 3/3) moist; moderate, fine, blocky and subangular blocky structure; hard, friable; few fine pores; continuous clay films; mildly alkaline; clear, smooth boundary.

B22t—15 to 19 inches, brown (10YR 4/3) clay, dark brown (10YR 3/3) moist; moderate, medium, blocky structure; very hard, very firm; few fine roots on ped surfaces; few fine pores; continuous clay films; mildly alkaline; gradual, smooth boundary.

B23t—19 to 60 inches, brown (7.5YR 5/4) clay, dark brown (7.5YR 4/4) moist; strong, medium, blocky structure; very hard, firm; few clay films; few calcium carbonate films and threads on ped surfaces; calcareous; moderately alkaline; gradual, wavy boundary.

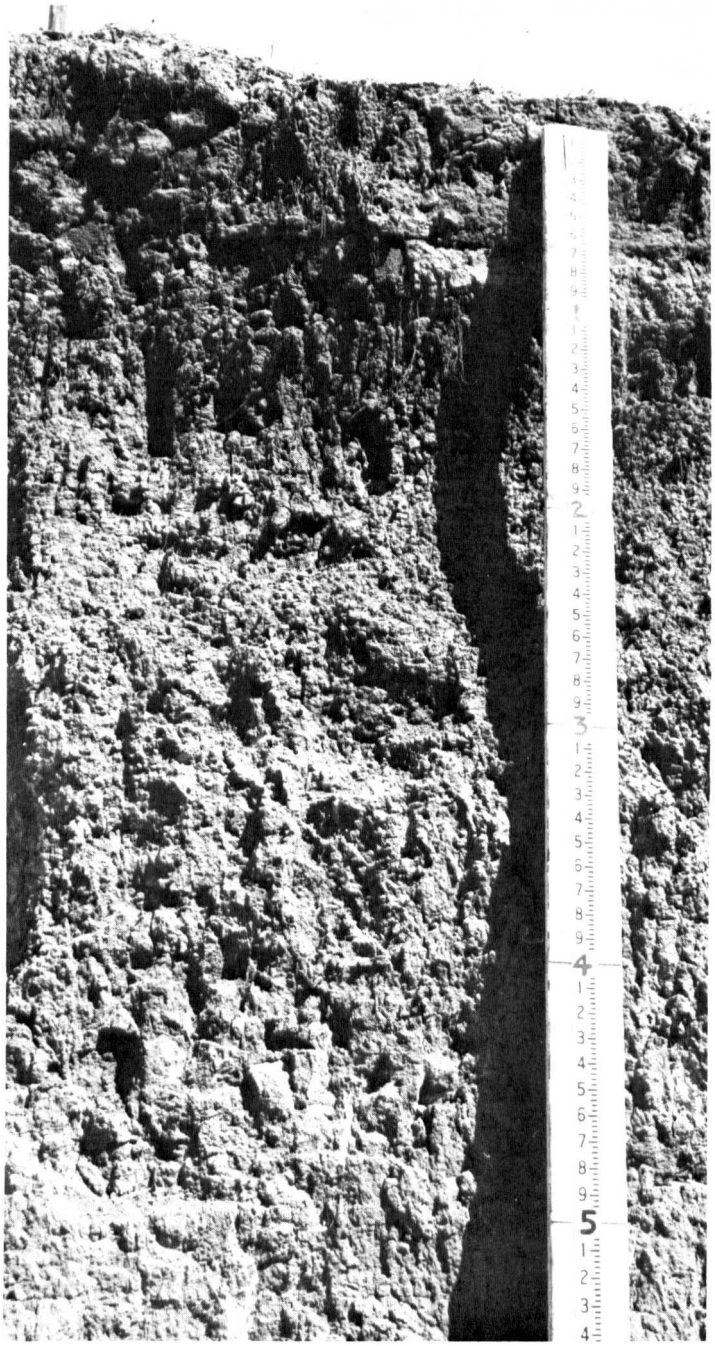

Figure 10.—**Blocky structure in a profile of Sherm clay loam.**

B24tca—60 to 78 inches, pink (7.5YR 7/4) clay loam, reddish yellow (7.5YR 7/6) moist; weak, medium, subangular blocky structure; hard, friable; few clay films; estimated 15 percent visible calcium carbonate as soft masses; calcareous; moderately alkaline; gradual, wavy boundary.

B25t—78 to 100 inches, reddish-yellow (7.5YR 7/6) clay loam, reddish yellow (7.5YR 6/6) moist; weak, subangular blocky structure; hard, friable; few clay films; estimated 10 percent visible calcium carbonate as soft masses; calcareous; moderately alkaline.

The solum is more than 60 inches thick. Secondary carbonates occur at a depth of 17 to 25 inches. The A horizon is 4 to 12 inches thick and is very dark grayish brown, dark grayish brown, grayish brown, dark brown, or brown.

The Bt horizon above a depth of 20 inches is very dark grayish brown, dark grayish brown, grayish brown, dark brown, or brown. The upper 20 inches of the Bt horizon is 40 to 45 percent clay. The Bt horizon below a depth of 20 inches is reddish yellow, yellowish red, pink, light brown, brown, light yellowish brown, or yellowish brown in color and is clay, clay loam, or silty clay loam in texture.

Sherm clay loam (Sh).—This nearly level soil is on broad plains in smooth areas that average about 300 acres in size.

Included with this soil in mapping are small areas of Dumas and Gruver soils.

This Sherm clay loam is suited to extensive farming. The hazards of soil blowing and water erosion are slight. Terraces and contour farming are needed on long slopes to increase the amount of water that soaks into the soil. Grassed waterways may be needed in some areas. Crop residue kept on the surface helps improve soil tilth. Fertilizer is needed on irrigated soils. A properly designed irrigation system is needed for uniform application of water to irrigated crops. Capability unit IIIe–5, dryland, and IIs–1, irrigated; Deep Hardland range site.

Spurlock Series

The Spurlock series consists of deep, well-drained, calcareous soils that are nearly level to gently sloping.

In a representative profile, the surface layer is brown, calcareous fine sandy loam about 6 inches thick. The next layer is brown sandy clay loam in the upper 8 inches and pale-brown to very pale brown clay loam in the next 34 inches. Below this, and extending to a depth of 90 inches, it is clay loam that is strong brown in the upper part and reddish yellow in the lower part.

Spurlock soils are moderately permeable, and runoff is medium. Their available water capacity is high. The lime in these soils causes chlorosis in some plants.

These Spurlock soils are used for crops and range. The crops are mainly wheat and grain sorghum. Most crops are irrigated by the sprinkler method.

Representative profile of Spurlock fine sandy loam, 0 to 3 percent slopes, 2 miles northwest of Dalhart, Tex., by U.S. Highway 87, then 12.5 miles west on Farm Road 1727, then 4.5 miles farther west on the county road extension of Farm Road 1727 (South Sedan Road), and 100 feet south of the right-of-way.

Ap—0 to 6 inches brown (10YR 5/3) fine sandy loam, dark brown (10YR 4/3) moist; weak, fine, granular structure; slightly hard, friable; few calcium carbonate concretions as large as 2 millimeters in diameter; calcareous; moderately alkaline; clear, smooth boundary.

B21—6 to 14 inches, brown (10YR 5/3) sandy clay loam, dark grayish brown (10YR 4/2) moist; weak, fine, granular and subangular blocky structure; slightly hard, very friable; many roots; few fine pores; calcareous; moderately alkaline; gradual, wavy boundary.

B22ca—14 to 24 inches, pale-brown (10YR 6/3) clay loam, brown (10YR 5/3) moist; weak, subangular blocky structure; slightly hard, friable; estimated 25 percent visible calcium carbonate as soft masses; calcareous; moderately alkaline; gradual, wavy boundary.

B23ca—24 to 48 inches, very pale brown (10YR 7/3) clay loam, pale brown (10YR 6/3) moist; weak, fine, subangular blocky structure; slightly hard, very friable; estimated 30 percent visible calcium carbonate as soft masses and weakly cemented concretions; calcareous; moderately alkaline; gradual, wavy boundary.

B24tb—48 to 72 inches, strong-brown (7.5YR 5/8) clay loam, strong brown (7.5YR 5/6) moist; weak, fine, subangular blocky structure; slightly hard, friable; few clay films; estimated 10 percent visible calcium carbonate as soft masses; calcareous; moderately alkaline; gradual, wavy boundary.

B25tb—72 to 90 inches, reddish-yellow (7.5YR 6/6) clay loam, strong brown (7.5YR 5/6) moist; weak, fine, subangular blocky structure; slightly hard, friable; few clay films; estimated 30 percent visible calcium carbonate as soft masses and strongly cemented concretions; calcareous; moderately alkaline.

The solum is more than 80 inches thick. Secondary carbonates are in the B2ca horizon at a depth of 10 to 18 inches.

The A horizon ranges from 5 to 8 inches in thickness and is fine sandy loam, loamy fine sand, or sandy clay loam. This layer is grayish brown, brown, light brownish gray, light brown, pale brown, or very pale brown.

The B21 horizon is 8 to 10 inches thick; is sandy clay loam, clay loam, or loam; and is grayish brown, brown, light brownish gray, light brown, pale brown, or very pale brown.

The Bca horizon is 12 to 38 inches thick and grayish brown, pale brown, very pale brown, brown, light brownish gray, pink, or white. This horizon is 25 to 50 percent calcium carbonate. The Btb horizon is clay loam or silty clay loam and is strong brown or reddish yellow.

Spurlock fine sandy loam, 0 to 3 percent slopes (SpB).—This nearly level to gently sloping soil is in long, narrow areas that average about 100 acres in size.

This soil has the profile described as representative for the Spurlock series.

Included with this soil in mapping are small areas of Conlen, Perico, and Sunray soils.

The hazards of soil blowing and water erosion are moderate on this Spurlock fine sandy loam. Crop residue kept on the surface helps to reduce soil blowing, which is the major concern where this soil is cultivated. Terracing and contour farming are needed on the more sloping areas to reduce runoff and water erosion. A properly designed irrigation system is needed for uniform application of water to irrigated crops. Capability unit IIIe–7, dryland, and IIIe–3, irrigated; Mixedland Slopes range site.

Spurlock fine sandy loam, 3 to 5 percent slopes (SpC).—This gently sloping soil is on ridges in long, narrow areas that average about 60 acres in size.

In a representative profile, the surface layer is grayish-brown, calcareous fine sandy loam about 5 inches thick. The next lower layer is brown clay loam in the upper 8 inches, white clay loam that contains soft powdery lime in the next 14 inches, and strong-brown clay loam below a depth of 27 inches.

Included with this soil in mapping are small areas of Berthoud, Conlen, and Perico soils.

This Spurlock fine sandy loam is used mainly for range, but some dryland wheat is grown. The hazards of water

erosion and soil blowing are moderate and are the main concerns where this soil is cultivated. Terraces and contour farming help control water erosion. Crop residues kept on the surface help to control soil blowing. A properly designed irrigation system is needed for uniform water application on irrigated crops. Capability unit IVe–3, dryland, and IVe–2, irrigated; Mixedland Slopes range site.

Spurlock soils, hummocky (SrB).—These gently sloping and hummocky soils are on eroded uplands. Soil areas retain the shape of the area that was cultivated. Areas average about 120 acres in size.

In a representative area, the surface layer has been reworked by wind. The area is alternating low dunes and blown-off areas. The dunes are 10 to 30 feet wide, about 200 feet long, and about 20 inches high. Most dunes are oriented in a southwest to northeast direction, and the dunes cover about 40 percent of the area. The rest is blown-off areas of exposed subsoil and layers of soft powdery lime. These areas retain the characteristics of the Spurlock series.

In a representative profile of a dune, the surface layer is brown, calcareous, stratified fine sandy loam, sandy clay loam, and loamy fine sand about 20 inches thick. Below this is pale-brown clay loam that contains soft powdery lime and is about 20 inches thick. Below this layer is reddish-yellow clay loam.

A representative profile in a blown-off area has a pale-brown, calcareous silt loam crust about 2 inches thick. Below this is pale-brown and reddish-yellow clay loam that contains soft powdery lime.

Included with these soils in mapping are areas, less than an acre in size, of Dallam and Perico soils. These soils show little effect of soil blowing.

All of these Spurlock soils, hummocky, are in range. Vegetation is sparse, and the hazard of soil blowing is high. The hazard of water erosion is moderate. A good cover of grasses is needed to help control soil blowing and water erosion. Capability unit VIe–3, dryland; Mixedland Slopes range site.

Sunray Series

The Sunray series consists of deep, well-drained, calcareous soils that are nearly level to gently sloping.

In a representative profile, the surface layer is dark grayish-brown, calcareous loam about 10 inches thick. The next lower layer is calcareous clay loam that extends to a depth of 80 inches. In sequence, the upper 7 inches is dark yellowish brown; the next 7 inches is grayish brown; the next 26 inches is white; and below this, to a depth of 80 inches, is reddish yellow (fig. 11).

Sunray soils are moderately permeable, and runoff is slow. Their available water capacity is high.

Sunray soils are used for crops and range. The main crops are irrigated wheat and grain sorghum, and some crops are dry farmed.

Representative profile of Sunray loam, 0 to 1 percent slopes, 5 miles north of Conlen, Tex., by Farm Road 807, then 5 miles west on a county road, then 0.9 mile north on a county road, and 300 feet east of the road in a cultivated field.

Ap—0 to 10 inches, dark grayish-brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate, medium, subangular and fine granular structure; hard, friable; calcareous; moderately alkaline; abrupt, smooth boundary.

B21t—10 to 17 inches, dark yellowish-brown (10YR 4/4) clay loam, dark yellowish brown (10YR 3/4) moist; weak, coarse, prismatic structure parting to moderate, medium and fine, subangular blocky; hard, friable; few clay films; few roots; few fine pores; few worm casts; calcareous; moderately alkaline; gradual, smooth boundary.

B22t—17 to 24 inches, grayish-brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; weak, coarse, prismatic structure parting to moderate, fine, granu-

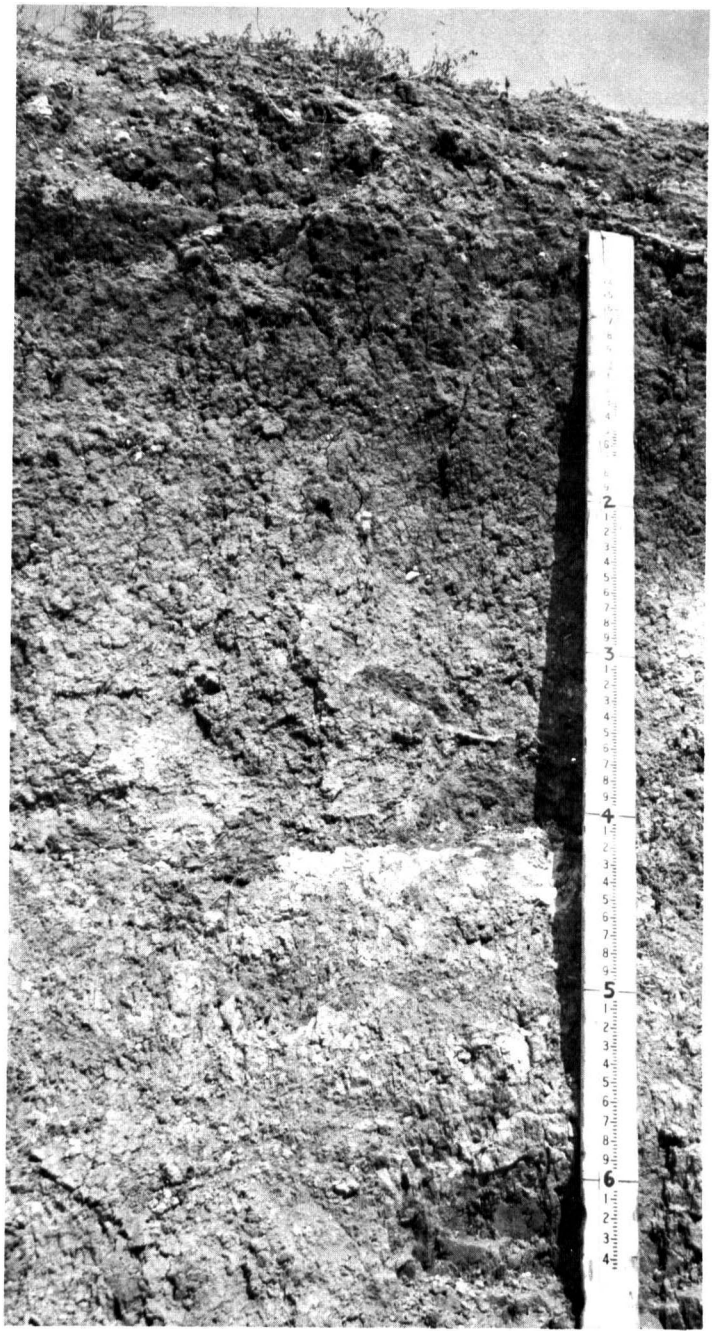

Figure 11.—**Profile of Sunray loam, 0 to 1 percent slopes. Clay loam, high in carbonates, is below a depth of 24 inches.**

lar; hard, friable; few clay films; calcareous; moderately alkaline; gradual, wavy boundary.

B23tca—24 to 50 inches, white (10YR 8/2) clay loam, light gray (10YR 7/2) moist; weak, fine, subangular blocky structure; soft, very friable; few clay films; estimated 40 percent visible calcium carbonate as soft masses; calcareous; moderately alkaline; gradual, wavy boundary.

B24t—50 to 80 inches, reddish-yellow (7.5YR 7/6) clay loam, reddish yellow (7.5YR 6/6) moist; weak, fine, subangular blocky structure; soft, very friable; few clay films; estimated 15 percent visible calcium carbonate as soft masses; calcareous; moderately alkaline.

The solum is more than 80 inches thick. Secondary carbonates are in the Btca horizon at a depth of 20 to 30 inches. The A horizon is 9 to 14 inches thick and is dark grayish brown, grayish brown, or brown.

The Bt horizon is 5 to 15 inches thick and is dark yellowish brown, brown, or grayish brown. The Btca horizon is 6 to 30 inches thick and is white, pink, light brown, light reddish brown, or reddish yellow. This horizon is loam, clay loam, or silty clay loam in texture and is 20 to 70 percent calcium carbonate. The B24t horizon is reddish yellow, light brown, or pink.

Sunray loam, 0 to 1 percent slopes (SuA).—This nearly level soil is in irregular areas that average about 150 acres in size. This soil has the profile described as representative for the Sunray series.

Included with this soil in mapping are small areas of Conlen, Dumas, and Texline soils.

The hazard of soil blowing is high, and the hazard of water erosion is slight on this Sunray loam. Crop residues kept on the surface help to reduce soil blowing. A properly designed irrigation system is needed for uniform application of water to irrigated crops. Capability unit IIIe–6, dryland, and IIe–5, irrigated; Hardland Slopes range site.

Sunray loam, 1 to 3 percent slopes (SuB).—This gently sloping soil is in areas that average about 80 acres in size and are longer than they are wide.

In a representative profile, the surface layer is dark grayish-brown, calcareous loam about 10 inches thick. The next layer is brown clay loam about 17 inches thick. A layer of pink clay loam, which contains soft powdery lime, begins about 27 inches below the surface and is 24 inches thick. Below this is reddish-yellow clay loam.

Included with this soil in mapping are small areas of Conlen, Dallam, and Dumas soils.

Most of this Sunray loam is in range, but some areas are in crops. Where this soil is cultivated, controlling soil blowing and water erosion is important. The hazard of soil blowing is high, and the hazard of water erosion is moderate. Terraces and contour farming reduce runoff and help control water erosion. Crop residues kept on the surface help to reduce soil blowing. A properly designed irrigation system is needed for uniform application of water to irrigated crops. Capability unit IIIe–6, dryland, and IIIe–5, irrigated; Hardland Slopes range site.

Texline Series

The Texline series consists of deep, well-drained, calcareous soils that are nearly level.

In a representative profile, the surface layer is brown, calcareous loam about 10 inches thick. The upper 28 inches of the next layer is clay loam. It is yellowish brown in the upper part and reddish yellow in the lower part. The lower 47 inches of this layer is sandy clay loam that is brown to dark brown in the upper part and strong brown and brown below.

Texline soils are moderately permeable, and runoff is very slow. Their available water capacity is high.

Most areas of these Texline soils are farmed to irrigated crops of wheat, grain sorghum, and alfalfa. Some areas are in range, and a few fields are dry farmed.

Representative profile of Texline loam, 0 to 1 percent slopes, 7.5 miles south of Conlen, Tex., on Farm Road 807, then 100 feet east of highway right-of-way in a cultivated field.

Ap—0 to 10 inches, brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; weak, fine, subangular blocky and granular structure; slightly hard, friable; many pores; common worm casts; calcareous; moderately alkaline; clear, smooth boundary.

B21t—10 to 26 inches, yellowish-brown (10YR 5/4) clay loam, dark yellowish brown (10YR 4/4) moist; weak, coarse, prismatic structure parting to weak, fine, subangular blocky; slightly hard, friable; few clay films; many pores; common worm casts; calcareous; moderately alkaline; gradual, wavy boundary.

B22tca—26 to 38 inches, reddish-yellow (7.5YR 6/6) clay loam, strong brown (7.5YR 5/6) moist; weak, coarse, prismatic structure parting to weak, fine, subangular blocky; hard, friable; few clay films; about 25 percent calcium carbonate; few, soft, calcium carbonate masses; calcareous; moderately alkaline; gradual, smooth boundary.

B23t—38 to 52 inches, brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 4/4) moist; weak, coarse, prismatic structure parting to weak, medium, subangular blocky; hard, friable; few clay films; few fine pores; calcareous; moderately alkaline; gradual, smooth boundary.

B24t—52 to 60 inches, dark-brown (7.5YR 4/4) sandy clay loam, dark brown (7.5YR 3/4) moist; weak, coarse, prismatic structure parting to weak, medium, subangular blocky; hard, firm; few clay films on peds; calcareous; moderately alkaline; clear, smooth boundary.

B25t—60 to 64 inches, strong-brown (7.5YR 5/6) sandy clay loam, strong brown (7.5YR 4/6) moist; weak coarse, prismatic structure parting to weak, medium, subangular blocky; slightly hard, friable; few clay films on peds; calcareous; moderately alkaline; clear, smooth boundary.

B26t—64 to 85 inches, brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 4/4) moist; weak, coarse, prismatic structure parting to weak, medium, subangular blocky and granular; hard, firm; few clay films; calcareous; moderately alkaline.

The solum is more than 60 inches thick. Layers that contain visible calcium carbonate are 16 to 30 inches below the surface. The A horizon is 10 to 19 inches thick and dark grayish brown or brown.

The B21t horizon is 6 to 18 inches thick and is light brownish gray, pale brown, light brown, yellowish brown, or brown. This horizon is loam or clay loam and is 18 to 35 percent clay.

The Btca horizon is 10 to 30 inches thick and is reddish yellow, light brown, brown, pink, very pale brown, pale brown, or light yellowish brown. This horizon is loam or clay loam and contains from 15 to 30 percent visible calcium carbonate. The Bt horizons below the Btca horizon are sandy clay loam or clay loam and are brown, dark brown, reddish brown, reddish yellow, yellowish red, or strong brown.

Texline loam, 0 to 1 percent slopes (TeA).—This nearly level soil is in smooth areas that average about 140 acres in size.

Included with this soil in mapping are small areas of Dumas, Gruver, and Humbarger soils.

The hazard of soil blowing is high, and the hazard of water erosion is slight on this Texline loam. Crop residues kept on the surface help protect the soil from blowing.

A properly designed irrigation system is needed for uniform water application on irrigated crops. Capability unit IIIe–6, dryland, and IIe–5, irrigated; Deep Hardland range site.

Valentine Series

The Valentine series consists of deep, excessively drained, hummocky to duned soils. These soils are neutral and gently undulating to rolling.

In a representative profile, the surface layer is very pale brown fine sand about 6 inches thick. Below this is very pale brown fine sand that is calcareous about 43 inches below the surface.

Valentine soils are rapidly permeable, and runoff is very slow. Their available water capacity is low. These Valentine soils are used for range. The vegetation is sparse in most areas.

Representative profile of Valentine fine sand, 18 miles northwest of Dalhart, Tex., by U.S. Highway 87, then 10 miles north on Farm Road 1879, and 0.6 mile west of roadway in range.

A1—0 to 6 inches, very pale brown (10YR 7/3) fine sand, pale brown (10YR 6/3) moist; single grained; loose; neutral; gradual, wavy boundary.

C—6 to 60 inches, very pale brown (10YR 7/4) fine sand; light yellowish brown (10YR 6/4) moist; single grained; loose; calcareous below a depth of 43 inches; moderately alkaline.

The solum is 5 to 13 inches thick. Calcareous material is 26 to 50 inches below the surface. The upper 40 inches of a profile of Valentine soil is fine sand or loamy sand. The A horizon is brown, pale brown, or very pale brown. The C horizon is light gray, light yellowish brown, pale brown, light brownish gray, or very pale brown.

These soils are outside the range of the Valentine series in that they are calcareous at depths below 2 feet. This difference does not alter use, management, or behavior of these soils.

Valentine fine sand (Va).—This soil ranges from gently undulating to rolling and from hummocky to duned. Slopes are 3 to 15 percent. Soil areas are irregular and are typically oriented in a southwest to northeast direction. They average about 300 acres in size.

This soil has the profile described as representative for the Valentine series.

Included with this soil in mapping are areas of Perico and Vingo soils. Some deep sands that have calcareous surface layers also are included.

All of this Valentine fine sand is in range. The hazard of soil blowing is high, and the hazard of water erosion is slight. A good cover of grasses is needed to help control soil blowing. Capability unit VIIe–1, dryland; Deep Sand range site.

Valentine-Spurlock complex, 5 to 15 percent slopes (VkE).—This mapping unit consists of alternating billowy, deep sands and bare, severely eroded soils. Mapped areas of this unit are blow out and duned and range from 20 to 500 acres in size (fig. 12).

The Valentine fine sand occurs as billowy, wind-deposited, partially stabilized dunes. The dunes are 20 to 30 feet higher than the areas of Spurlock soils. The dunes have

Figure 12.—Typical landscape of the Valentine-Spurlock complex. Eroded Spurlock soils are in the foreground, and Valentine fine sand is in the background.

a general southwest to northeast direction and make up about 60 percent of a mapped area. A representative profile of this Valentine fine sand has a pale-brown surface layer of fine sand about 8 inches thick. Below this is very pale brown fine sand that is neutral to a depth of about 50 inches and calcareous below this depth.

The Spurlock soils are severely eroded and have many caliche pebbles on the surface. The areas are bare. Winds have removed all of the surface layer and exposed layers of soft powdery lime. In a representative profile of these Spurlock soils, the surface layer is pink sandy clay loam about 8 inches thick. Below this is strong-brown clay loam.

Included in areas of this mapping unit are active dunes. These dunes have no vegetation and are still being worked by winds. Also included are areas of Perico soils in the eroded places. All inclusions make up less than 6 percent of any mapped area.

All of this mapping unit is in range. Vegetation is sparse, and reseeding has not been successful. The hazard of soil blowing is high, and the hazard of water erosion is slight. A good cover of grasses is needed to help control soil blowing. Capability unit VIIe–2, dryland; Deep Sand range site.

Vingo Series

The Vingo series consists of deep, well-drained, undulating or hummocky soils.

In a representative profile, the surface layer is yellowish-brown loamy fine sand about 18 inches thick. The next layer is yellowish-brown fine sandy loam in the upper 30 inches. Below this, it is yellowish-red sandy clay loam to a depth of 100 inches.

Vingo soils are moderately rapidly permeable, and runoff is very slow. Their available water capacity is high. Most of these Vingo soils are in range. Some areas are planted to irrigated crops of wheat, grain sorghum, and corn.

Representative profile of Vingo loamy fine sand, in an area of Vingo and Dallam soils, undulating, 2 miles northwest of Dalhart, Tex., by U.S. Highway 87, then 12.5 miles west on Farm Road 1727, then 13.5 miles on the county road extension of Farm Road 1727 (South Sedan road), and 100 feet north of road in range.

A1—0 to 18 inches, yellowish-brown (10YR 5/4) loamy fine sand, dark yellowish brown (10YR 4/4) moist; weak, subangular blocky and granular structure; loose, very friable; few roots; neutral; gradual, smooth boundary.

B21t—18 to 48 inches, yellowish-brown (10YR 5/4) fine sandy loam, dark yellowish brown (10YR 4/4) moist; weak, coarse, prismatic structure parting to weak, medium, subangular blocky; soft, very friable; few roots and pores; sand grains bridged with clay; few worm casts; neutral; clear, smooth boundary.

B22t—48 to 100 inches, yellowish-red (5YR 5/8) sandy clay loam, yellowish red (5YR 4/8) moist; weak, medium, subangular blocky structure; soft, very friable; sand grains bridged with clay; few clay films; few faint films and threads of calcium carbonate; calcareous; moderately alkaline.

The solum is more than 60 inches thick. Secondary carbonates are 37 to 80 inches below the surface. The A horizon is 5 to 20 inches thick and is light brown, brown, grayish brown, light yellowish brown, or yellowish brown.

The B21t horizon is 17 to 35 inches thick and is yellowish brown, brown, or reddish yellow. This horizon is fine sandy loam in texture and is 14 to 18 percent clay.

The B22t horizon is sandy clay loam or fine sandy loam in texture and is strong brown, yellowish red, or reddish yellow.

Vingo and Dallam soils, undulating (VIC).—This mapping unit is made up of undulating and hummocky soils in smooth, rounded areas that average about 700 acres in size. Areas of this unit are alternating ridges and lows. The ridges make up about 65 percent of the unit. They are about 10 feet high and have short side slopes that range up to 8 percent. Ridges are 150 to 400 feet from crest to crest. The delineations are much larger, and the composition of these units is more variable than other mapping units in the county. Mapping has been controlled well enough, however, for the anticipated use of the soils.

Vingo soils are on the ridges, and the profile of this soil is the one described as representative for the Vingo series.

Dallam loamy fine sand is in the depressed areas between the ridges. In a representative profile, the surface layer is brown loamy fine sand about 12 inches thick. The next layer is sandy clay loam. It is brown in the upper 5 inches, yellowish brown in the next 13 inches, pink in the next 20 inches, and reddish yellow below a depth of 50 inches.

Included in this mapping unit are small areas of Perico and Valentine soils.

The hazard of soil blowing is high, and the hazard of water erosion is slight on this mapping unit. Where this unit is cultivated, minimum tillage and stubble mulching are needed to keep crop residues on the surface and to help control soil blowing. A properly designed irrigation system is needed for uniform application of water on irrigated crops. Capability unit VIe–1, dryland, and IVe-3, irrigated; Sandyland range site.

Use and Management of the Soils

This section discusses the use and management of the soils of Dallam County for crops, range, and wildlife habitat, and for engineering purposes.

Specific management of the soils for crops is discussed in the section "Descriptions of the Soils." The system of capability grouping and classification used by the Soil Conservation Service is explained in this section. Estimated yields of the main crops grown on the soils under dryland and irrigated farming also are given. The capability classification of each of the soils of Dallam County is shown in the "Guide to Mapping Units" at the back of this survey.

Capability Grouping

Some readers, particularly those who farm on a large scale, may find it practical to use and manage alike some of the different kinds of soil on their farm. These readers can make good use of the capability classification system, a grouping that shows, in a general way, the suitability of soils for most kinds of farming.

The grouping is based on permanent limitations of soils when used for field crops, the risk of damage when they are farmed, and the way the soils respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or

other characteristics of the soils; does not consider possible, but unlikely, major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops that require special management.

Those familiar with the capability classification can infer from it much about the behavior of soils when used for other purposes, but this classification is not a substitute for interpretations designed to show suitability and limitations for range, for forest trees, or for engineering.

In a capability system, the kinds of soil are grouped at three levels: the class, the subclass, and the unit. The broadest grouping, the capability class, is designated by Roman numerals I to VIII. In class I are the soils that have the fewest limitations, the widest range of use, and the least risk of damage when they are used. (There are no class I soils in Dallam County.) The soils in the other classes have progressively greater natural limitations. In class VIII are soils and land forms so rough, shallow, or otherwise limited that they do not produce worthwhile yields of crops, forage, or wood products. (There are no class VIII soils in Dallam County.)

The subclass indicates major kinds of limitations within the classes. Within most of the classes there can be as many as four subclasses. The subclasses are indicated by adding a small letter, e, w, s, or c, to the class numeral, for example, IIe. The letter "e" shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; "w" means that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); "s" shows that the soil is limited mainly because it is shallow, droughty, or stony; and "c" indicates that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few or no limitations. Class V can contain, at the most, only subclasses w, s, and c, because the soils are subject to little or no erosion but have other limitations that confine their use largely to pasture, range, or wildlife.

In Dallam County, the soils are grouped according to both irrigated and dryland uses. Thus, Gruver loam, 0 to 1 percent slopes, is classified IIe–2 where irrigated and IIIe–3 where dry-farmed.

Subclasses are further divided into groups called capability units. These are groups of soils that are so much alike that they are suited to the same crops and pasture plants; require about the same management; and have generally similar productivity and other response to management. Capability units are generally identified by numbers assigned locally, for example, IIe–1 or IIIe–4. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation; the small letter indicates the subclass, or kind of limitation, as defined in the foregoing section; and the Arabic numeral specifically identifies the capability unit within each subclass.

The eight classes in the capability system and the subclasses and units in Dallam County are described in the list that follows. The capability unit designation for each soil is given in the Guide to Mapping Units.

Dryland Capability Units

Class I. Soils have few limitations that restrict their use.
(No Class I soils in Dallam County.)

Class II. Soils have moderate limitations that reduce the choice of plants or require moderate conservation practices.
- Subclass IIe. Soils subject to moderate erosion unless protected.
  - Unit IIe–1. Nearly level, loamy, calcareous soils that are moderately permeable and on bottom lands. Humbarger loam is the only soil in this unit.

Class III. Soils have severe limitations that reduce the choice of plants, require special conservation practices or both.
- Subclass IIIe. Soils subject to severe erosion if they are cultivated and not protected.
  - Unit IIIe–1. Nearly level to gently sloping, loamy, noncalcareous soils that are moderately permeable.
  - Unit IIIe–2. Nearly level, loamy, calcareous soils that are moderately rapidly permeable and are on bottom lands. Dalupe fine sandy loam is the only soil in this unit.
  - Unit IIIe–3. Nearly level to gently sloping, loamy noncalcareous soils that are moderately slowly permeable to moderately permeable.
  - Unit IIIe–4. Nearly level, loamy, noncalcareous soils that are moderately slowly permeable, Rickmore fine sandy loam, 0 to 1 percent sloping is the only soil in this unit.
  - Unit IIIe–5. Nearly level, loamy, noncalcareous soils that are very slowly permeable. Shows clay loam is the only soil in this unit.
  - Unit IIIe–6. Nearly level to gently sloping, loamy calcareous soils that are moderately permeable.
  - Unit IIIe–7. Nearly level to gently sloping, loamy calcareous soils that are moderately permeable.

Class IV. Soils have very severe limitations that reduce the choice of plants, require very careful management, or both.
- Subclass IVe. Soils subject to very severe erosion if they are cultivated and not protected.
  - Unit IVe–1. Gently sloping, loamy, calcareous soils that are moderately permeable.
  - Unit IVe–2. Nearly level to gently sloping and gently undulating, sandy, calcareous and noncalcareous soils that are moderately slowly permeable to moderately permeable.
  - Unit IVe–3. Gently sloping, loamy, calcareous soils that are moderately permeable.
  - Unit IVe–4. Nearly level, loamy, calcareous soils that are very slowly permeable. Church soils are the only soils in this unit.
  - Unit IVe–5. Nearly level, loamy, calcareous soils that are moderately permeable. The Kerrick part of the Kerrick-Plack association, nearly level, is the only soil in this unit.

Class V. Soils are subject to little or no erosion but have other limitations, impractical to remove, that limit their use largely to range or wildlife habitat.
- Subclass Vw. Soils subject to frequent flooding.
  - Unit Vw–1. Nearly level, sandy, calcareous soils that are rapidly permeable. Corlena soils are the only soils in this unit.

Class VI. Soils have severe limitations that make them generally unsuited to cultivation and largely limit their use to range or wildlife habitat.
- Subclass VIe. Soils severely limited, chiefly by risk of erosion, unless protective cover is maintained.
  - Unit VIe–1. Undulating and hummocky, sandy, noncalcareous soils that are moderately permeable to moderately rapidly permeable. Vingo and Dallam soils, undulating, are the only soils in this unit.
  - Unit VIe–2. Sloping, loamy, calcareous soils that are moderately permeable. Berthoud loam, 5 to 8 percent slopes, is the only soil in this unit.
  - Unit VIe–3. Gently sloping and hummocky, eroded, calcareous soils that are moderately permeable. Spurlock soils, hummocky, are the only soils in this unit.
- Subclass VIw. Soils subject to frequent flooding and wetness.
  - Unit VIw–1. Nearly level, clayey, noncalcareous soils that are very slowly permeable. Ness clay is the only soil in this unit.

Class VII. Soils have very severe limitations that make them unsuited to cultivation and restrict their use largely to range or wildlife habitat.
- Subclass VIIe. Soils very severely limited, chiefly by risk of erosion unless protective cover is maintained.
  - Unit VIIe–1. Gently undulating to rolling and hummocky, sandy, noncalcareous soils that are rapidly permeable. Valentine fine sand is the only soil in this unit.
  - Unit VIIe–2. Gently rolling to rolling, billowy, sandy, noncalcareous to calcareous soils that are moderately permeable to rapidly permeable. Valentine-Spurlock association, 5 to 15 percent slopes, is the only component of this unit.
- Subclass VIIs. Soils very severely limited by shallow depth.
  - Unit VIIs–1. Nearly level to gently sloping, loamy, calcareous soils that are moderately permeable to very slowly permeable.

Class VIII. Soils and landforms having limitations that preclude their use for commercial crop production and restrict their use to recreation, wildlife habitat, or esthetic purposes. (There are no Class VIII soils in Dallam County.)

Irrigated Capability Units

Class I. Soils have few limitations that restrict their use. (There are no Class I soils in Dallam County.)

Class II. Soils have moderate limitations that reduce the choice of plants or require moderate conservation practices.
- Subclass IIe. Soils subject to moderate erosion unless protected.
  - Unit IIe–1. Nearly level, loamy, noncalcareous soils that are moderately permeable. Dallam fine sandy loam, 0 to 1 percent slopes, is the only soil in this unit.
  - Unit IIe–2. Nearly level, loamy, noncalcareous soils that are moderately slowly permeable to moderately permeable.
  - Unit IIe–3. Nearly level, loamy, calcareous soils that are moderately permeable to moderately rapidly permeable.
  - Unit IIe–4. Nearly level, loamy, noncalcareous soils that are moderately slowly permeable. Rickmore fine sandy loam, 0 to 1 percent slopes, is the only soil in this unit.
  - Unit IIe–5. Nearly level, loamy, calcareous soils that are moderately permeable.
- Subclass IIs. Soils moderately limited because of very slow permeability.
  - Unit IIs–1. Nearly level, loamy, noncalcareous soils. Sherm clay loam is the only soil in this unit.

Class III. Soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.
- Subclass IIIe. Soils subject to severe erosion if they are cultivated and not protected.
  - Unit IIIe–1. Gently sloping, loamy, noncalcareous soils that are moderately permeable. Dallam fine sandy loam, 1 to 3 percent slopes, is the only soil in this unit.
  - Unit IIIe–2. Nearly level to gently sloping and gently undulating, sandy, calcareous and noncalcareous soils that are moderately permeable to moderately slowly permeable.
  - Unit IIIe–3. Nearly level to gently sloping, loamy, calcareous soils that are moderately permeable.
  - Unit IIIe–4. Gently sloping, loamy, noncalcareous soils that are moderately permeable to moderately slowly permeable.
  - Unit IIIe–5. Nearly level to gently sloping, loamy, calcareous soils that are moderately permeable.
  - Unit IIIe–6. Nearly level, loamy, calcareous soils that are very slowly permeable. Church soils are the only soils in this unit.

Class IV. Soils have very severe limitations that reduce the choice of plants, require very careful management, or both.
- Subclass IVe. Soils subject to very severe erosion if they are cultivated and not protected.
  - Unit IVe–1. Gently sloping, loamy, calcareous soils that are moderately permeable.
  - Unit IVe–2. Gently sloping, loamy, calcareous soils that are moderately permeable.
  - Unit IVe–3. Undulating and hummocky, sandy, noncalcareous soils that are moderately rapidly permeable to moderately permeable. Vingo and Dallam soils, undulating, are the only soils in this unit.
  - Unit IVe–4. Nearly level, loamy, calcareous soils that are moderately permeable to very slowly permeable. The Kerrick part of the Kerrick-Plack association, nearly level, is the only soil in this unit.

Estimated Yields

Crop yields in Dallam County depend on how well the soils have been managed. Consistent high yields can be obtained if the soils are used within their capabilities and are managed according to their needs.

Table 2 gives, for each soil in the county judged suitable

TABLE 2.—*Estimated average yields per acre of principal crops under a high level of management*

[Absence of data indicates that the crop is not generally grown on the soil. Only arable soils are listed]

Soil	Wheat		Grain sorghum		Alfalfa hay
	Dryland	Irrigated	Dryland	Irrigated	Irrigated
	Bu.	*Bu.*	*Lbs.*	*Lbs.*	*Tons*
Berthoud loam, 3 to 5 percent slopes	10	30	750	4, 000	
Conlen loam, 0 to 3 percent slopes	10	35	750	4, 500	4. 0
Conlen loam, 3 to 5 percent slopes	10		750		
Dallam fine sandy loam, 0 to 1 percent slopes	10	40	1, 000	6, 000	4. 6
Dallam fine sandy loam, 1 to 3 percent slopes	10	40	1, 000	5, 500	
Dallam loamy fine sand, 0 to 3 percent slopes	10	25	1, 000	4, 500	
Dalupe fine sandy loam	15	40	1, 000	6, 250	5. 0
Dumas loam, 0 to 1 percent slopes	15	45	1, 000	6, 000	5. 0
Dumas loam, 1 to 3 percent slopes	15	40	1, 000	5, 500	
Gruver loam, 0 to 1 percent slopes	15	45	1, 000	6, 000	4. 6
Gruver loam, 1 to 3 percent slopes	15	40	1, 000	5, 500	
Humbarger loam	15	40	1, 000	6, 250	5. 0
Perico fine sandy loam, 0 to 1 percent slopes	10	30	1, 000	4, 500	3. 8
Perico fine sandy loam, 1 to 3 percent slopes	10	30	1, 000	4, 500	3. 8
Perico fine sandy loam, 3 to 5 percent slopes	10				
Perico loamy fine sand, 0 to 3 percent slopes	10	25	1, 000	4, 500	
Rickmore fine sandy loam, 0 to 1 percent slopes	15	45	1, 250	4, 500	
Rickmore loamy fine sand, 0 to 3 percent slopes	10	25	1, 000	4, 500	
Sherm clay loam	15	50	750	6, 500	
Spurlock fine sandy loam, 0 to 3 percent slopes	10	30	1, 000	4, 500	5. 0
Spurlock fine sandy loam, 3 to 5 percent slopes	10				
Sunray loam, 0 to 1 percent slopes	15	40	1, 000	5, 500	4. 0
Sunray loam, 1 to 3 percent slopes	15	40	1, 000	5, 000	
Texline loam, 0 to 1 percent slopes	15	40	1, 000	5, 500	4. 0
Vingo and Dallam soils, undulating		20		4, 000	

for crops, predicted average yields per acre under a high level of management. These predictions are for wheat and grain sorghum on dryland and irrigated soils and alfalfa hay on irrigated soils. The predictions are based on experiments over a period of 10 to 20 years and on information obtained from farmers and others familiar with the soils.

A high level of management for dryland soils in this county consists of: (1) managing crop residue in a way that effectively controls erosion and protects the soil; (2) using a cropping sequence that maintains an adequate supply of organic material; (3) maintaining fertility by timely application of fertilizer and by growing soil-improving crops; (4) conserving rainwater; (5) controlling insects, diseases, and weeds; (6) keeping tillage to a minimum and tilling only when the moisture content is such that compaction is minimized; (7) planting improved crop varieties; and (8) using terraces and other mechanical aids and maintaining them.

A high level of management for irrigated soils includes the foregoing practices in addition to: (1) applying water according to the needs of the crops and the soil; (2) coordinating tillage operations with irrigation operations; and (3) using properly designed irrigation systems and land treatments to help reduce erosion.

Use of the Soils for Range [2]

Ranching and livestock farming are important in Dallam County. Native range covers about 55 percent of the county. The average size ranch is about 5,000 acres.

[2] By JOHN A. WRIGHT, range conservationist, Soil Conservation Service.

Most ranchers have a cow-calf type of operation; that is, they raise calves that are marketed at weaning time. Some ranchers buy steers at weaning time, graze them for a year, and then sell them to feeders. Interest in feedlot operations is growing.

Two general types of grassland predominate in the county. The most abundant is the sandy land, which produces mid and tall grasses. The other major grassland area is the hardlands, which are loam or clay loam soils that produce short grasses. Some minor areas of very shallow range support only sparse vegetation. The bottom lands in the county are of minor extent but are important to ranching during dry years.

Range sites and condition classes

A range site is a distinctive kind of rangeland that differs from other kinds in its potential to produce native plants.

A range site produces kinds or proportions of plants or total annual yield significantly different from those on other range sites, or has differences sufficient to require some variation in management, such as a different rate of stocking.

Differences in kinds, proportion, and productivity of plants on different range sites are in large measure related to differences in soil, topography, climate, and related environmental factors. Range sites therefore can be identified by the kinds of soil, which are known to be capable of producing the distinctive climax vegetation, or potential plant community, that characterizes the specific site.

In most native grassland, however, the potential plant

community has been altered by several generations of grazing. Degree of alteration is indicated by range condition.

Range condition is the present state of the vegetation of a range site in relation to the potential plant cover for that site. *Range condition classes* measure the degree to which the present plant composition, expressed in percentage, resembles that of the potential plant community for that range site. Four range condition classes are recognized. A range site is in excellent condition if 76 to 100 percent of its vegetation is of the same kind as the original, or climax, vegetation. It is in good condition if the percentage is between 51 and 75, in fair condition if the percentage is between 26 and 50, and is in poor condition if the percentage is less than 25.

In determining present range condition classes, the plants on the range site are classed according to the way they are affected by continuous heavy grazing of the potential plant community. These groups, or classes, of plants are *decreasers*, *increasers*, and *invaders*.

Decreasers are kinds of plants in the potential plant community that decrease in relative abundance when the community is subjected to continued moderately heavy grazing. Most of these kinds of plants are highly preferred by grazing animals and decrease with excessive use. The total of all kinds of decreaser plants is counted in determining range condition class.

Increasers are kinds of plants in the potential plant community that normally increase in relative abundance when the community that normally is subjected to continued moderately heavy to heavy grazing. Some increasers that have moderately high grazing preference may initially increase and then decrease as grazing pressure continues. Others of low grazing preference may continue to increase either in actual plant numbers or in relative proportions. Only the kinds of increaser plants normally expected to occur in the potential plant community are counted in determining range condition. The total of increaser plants is recorded as a precentage of the potential plant community.

Invader plants are not members of the potential plant community for the site. They invade the community as a result of various kinds of disturbance. They may be annual or perennial grasses, weeds, or woody plants. Some have relatively high grazing value, but many are worthless. They are worthless in that they provide very little grazing (if any) and compete with more desirable plants for sunlight, moisture, and nutrients.

For most range sites and most range livestock operations, the higher the range condition class, the greater are the quality and amount of available forage.

Most of the rangeland in Dallam County is in good condition. In places, overgrazing has destroyed the better grasses, and the range is in poor condition. Buffalograss has thickened on most ranges. On the sandier sites, yucca and sand sagebrush are increasing.

Descriptions of range sites

The range sites of Dallam County are described in the following pages. The "Guide to Mapping Units" at the back of this survey shows the range site for the mapping units in the county.

BOTTOMLAND RANGE SITE

This range site is made up of nearly level loams and fine sandy loams. These soils are on flood plains along streambeds and in draws or valleys. They are moderately permeable or moderately rapidly permeable.

The composition of the climax vegetation varies from place to place, depending on the texture of the alluvial deposits. About 70 percent of the climax grasses is sand bluestem, little bluestem, switchgrass, Canada wildrye, and side-oats grama. Other climax grasses on this site are western wheatgrass, silver bluestem, alkali sacaton, blue grama, and inland saltgrass.

The main invaders are sunflower, cocklebur, common broomweed, and sandbur. Seed of these plants wash in from other areas. Other invaders are common forbs, sand dropseed, and three-awn.

Where this site is in excellent condition, the average annual acre yield of air-dry herbage ranges from 3,800 pounds in wet years to 2,100 pounds in dry years. More than 95 percent of this herbage is usable by cattle.

DEEP HARDLAND RANGE SITE

This range site is made up of smooth, nearly level to gently sloping, loamy soils on upland plains. These soils are moderately permeable to very slowly permeable.

The potential plant community is short grasses. Blue grama makes up about 70 percent of the vegetation where the site is in excellent condition. Buffalograss and sand dropseed make up the other 30 percent.

Continuous overgrazing results in an increase of buffalograss. Perennial three-awn, hairy tridens, broom snakeweed, and pricklypear cactus increase after further deterioration.

In lower condition classes and during years in which there is a wet spring, such invading annuals as evax, plantain, common broomweed, and little barley grow in the bare spots.

Through proper management, this site can be brought back to its original productive state. Where this site is in excellent condition, the average annual acre yield of air-dry herbage ranges from 2,200 pounds in wet years to 1,300 pounds in dry years. More than 95 percent of the herbage is usable by cattle.

DEEP SAND RANGE SITE

This range site is made up of gently undulating to rolling and hummocky to duned, billowy fine sand to sandy clay loam on uplands. The areas of these soils give the appearance of stabilized dunes. These soils are moderately permeable to rapidly permeable.

The vegetation is mainly tall grass. The climax grasses that account for about 70 percent of the original vegetation are mainly sand bluestem and little bluestem. Other important grasses that make up about 30 percent of the original composition are feather bluestem, sand dropseed, and perennial three-awn. Along with these increasers are woody plants such as sand sagebrush. Invaders are mainly annual three-awn, tumble lovegrass, and common ragweed.

Where this site is in excellent condition, the average annual acre yield of air-dry herbage ranges from 2,200 pounds in wet years to 1,400 pounds in dry years. More than 95 percent of the herbage is usable by cattle.

HARDLAND SLOPES RANGE SITE

This site consists of nearly level to sloping soils that have a loam surface layer and are moderately permeable.

Some of the important climax grasses are side-oats

grama and blue grama. If grazing is heavy, buffalograss, sand dropseed, and other grasses replace the side-oats grama. Under moderately heavy grazing, this site maintains a good cover of grasses. Response to management is good. Maximum yields are obtained when the site is managed in such a way that side-oats grama is maintained. A thinning of side-oats grama is a good indication that the site is overgrazed.

Western ragweed, pricklypear cactus, yucca, and broom snakeweed are the most common invaders.

Where this site is in excellent condition, the average annual acre yield of air-dry herbage ranges from 2,200 pounds in wet years to 1,400 pounds in dry years. More than 95 percent of the herbage is usable by cattle.

HIGH LIME RANGE SITE

Church soils are the only soils in this range site. This site consists of nearly level, clay loam benches around the salty playas. Permeability is very slow.

The vegetation on this site is generally made up of only a few kinds of plants. The main grasses are blue grama, side-oats grama, and alkali sacaton. In many areas, buffalograss, black grama, and sand dropseed are dominant on the site. Further deterioration of the site results in an invasion of inland saltgrass, sand muhly, and annuals.

Where this site is in excellent condition, the average annual acre yield of air-dry herbage ranges from 1,800 pounds in wet years to 1,100 pounds in dry years. More than 95 percent of the herbage is usable by cattle.

MIXEDLAND SLOPES RANGE SITE

This range site is made up of nearly level to gently sloping soils on upland plains. These soils have a fine sandy loam, loamy fine sand, or sandy clay loam surface layer. They are moderately permeable.

The main grasses in the climax plant community are side-oats grama, little bluestem, and other tall grasses.

Other grasses are buffalograss, perennial three-awn, sand dropseed, and hairy grama. Invaders are mainly western ragweed, yucca, and annual grasses and forbs. Most areas are mixtures of side-oats grama, blue grama, and a scattering of yucca and sand sagebrush. The more palatable grasses are becoming thicker because yucca and sand sagebrush are controlled and other good management is practiced.

Where this site is in excellent condition, the average annual acre yield of air-dry herbage ranges from 3,000 pounds in wet years to 1,500 pounds in dry years. More than 95 percent of the herbage is usable by cattle.

SANDY BOTTOMLAND RANGE SITE

Corlena soils are the only soils in this range site. These soils are nearly level loamy fine sand on bottom lands. They are rapidly permeable.

The potential plant community is mainly mid and tall grasses. Indiangrass, switchgrass, and sand bluestem are dominant on the site where it is in original condition. Other grasses are side-oats grama, little bluestem, and Canada wildrye. Some 70 percent of the original vegetation is made up of these grasses.

Any deterioration caused by overgrazing results in a rapid increase of such grasses as perennial three-awn, sand dropseed, and blue grama.

Further degeneration in the plant community results in an invasion of gummy lovegrass, annual three-awn, tumble lovegrass, low-growing paspalums, and various annuals. Woody invaders are yucca and sand sagebrush.

Where this site is in excellent condition, the average annual acre yield of air-dry herbage ranges from 3,700 pounds in wet years to 2,000 pounds in dry years. More than 95 percent of the herbage is usable by cattle.

SANDYLAND RANGE SITE

This site is made up of nearly level to gently sloping and undulating soils. These soils have a loamy fine sand surface layer. Permeability is moderately slow to moderately rapid.

If properly managed, this site produces good stands of mid and tall grasses. About 75 percent of the potential plant community is sand bluestem, switchgrass, indiangrass, little bluestem, and side-oats grama. Approximately 25 percent of the plants are silver bluestem, sand bluestem, sand dropseed, hairy grama, and three-awn.

Any deterioration in this site results in a rapid spread of yucca and sand sagebrush. Among invading grasses are annual three-awn, fringed signalgrass, tumble lovegrass, and low-growing paspalums. The main invading forbs are common ragweed, tumble ringwing, annual wildbuckwheat, and rosering gaillardia.

Where this site is in excellent condition, the average annual acre yield of air-dry herbage ranges from 3,000 pounds in wet years to 1,600 pounds in dry years. More than 95 percent of the herbage is usable by cattle.

SANDY LOAM RANGE SITE

This site is made up of nearly level to gently sloping soils. These soils have a fine sandy loam surface layer and are moderately slowly permeable to moderately permeable.

The main kinds of plants in the potential plant community are side-oats grama, blue grama, and buffalograss, and traces of little bluestem. Yucca and sand sagebrush are scattered in most areas and, in some areas, require treatment for control.

In the overgrazed areas, blue grama and buffalograss increase and are dominant. If overgrazing of the range is continued, broom snakeweed, western ragweed, and other invaders dominate. In most areas, blue grama is dominant, and yucca is increasing in density.

Where this site is in excellent condition, the average annual acre yield of air-dry herbage ranges from 3,000 pounds in wet years to 1,600 pounds in dry years. More than 95 percent of the herbage is usable by cattle.

VERY SHALLOW RANGE SITE

This site consists of nearly level to gently sloping loamy soils. They are moderately permeable to very slowly permeable.

Although vegetation on this site is normally sparse, it generally is in a higher condition class than adjacent sites that have a good variety of grasses in their climax vegetation. This site has the appearance of a mid grass site, and side-oats grama is the dominant grass. Blue grama is present in most areas.

Where this site is in excellent condition, the average annual acre yield of air-dry herbage ranges from 800 pounds in wet years to 400 pounds in dry years. More than 95 percent of the herbage is usable by cattle.

Use of the Soils for Wildlife

Large numbers of jackrabbit, scaled (blue) quail, bobwhite quail, dove, badger, ground squirrel, various songbirds, and such predators as hawk, swift fox, and coyote inhabit Dallam County. Also present are antelope, raccoon, skunk, opossum, and prairie dog. Golden eagle and curlew migrate into the county each year. Stubble fields furnish cover for pheasant, which were introduced into the county. The grainfields in intermittent playas attract duck, geese, and sandhill crane during migration. The rattlesnake is the only poisonous snake that is native to this county. Production of fish is limited in the county. Dallam County is a treeless prairie that has a few intermittent streams and playas. The absence of native trees limits the brushland wildlife habitat. Abandoned homesites having a few introduced elms and a few areas of low sand sagebrush provide the only woody habitat in the county.

Soil interpretations for wildlife habitat

Successful management of wildlife on any tract of land requires, among other things, that food, cover, and water be available in a suitable combination. Lack of any one of these three, an unfavorable balance among them, or inadequate distribution of them may severely limit or account for the absence of a desired kind of wildlife. Soil information provides a valuable tool in creating, maintaining, or improving food, cover, and water for wildlife.

Most wildlife habitats are created or managed by planting suitable vegetation and by properly managing or improving existing vegetation. The influence of a soil on plant growth is known for many kinds of soils and can be inferred for others from a knowledge about the soil characteristics. Water areas can be created or improved as wildlife habitats.

Soil interpretations for wildlife habitat serve as indicators of the level of management intensity needed to achieve satisfactory results. They also serve as a means of showing why it may not be feasible to manage a particular area for a given kind of wildlife. The interpretations may serve as a basis for planning wildlife management areas, parks, or natural areas, or for acquiring wildlife lands. The interpretations also may be important where wildlife is a secondary use, for example, on range.

Soil properties that affect the growth of wildlife habitat are: (1) thickness of the soil, (2) texture of the surface layer, (3) available water capacity to a depth of 40 inches, (4) wetness, (5) surface stoniness, (6) flood hazard, (7) slope, (8) climate, and (9) salinity.

The soil areas shown on the soil survey maps are rated without regard to their position in relation to adjoining areas. The size, shape, or location of the outlined area does not affect the rating. Certain influences on habitat, such as elevation and aspect, must be appraised at the site.

In table 3, the soils of Dallam County are rated for their potential to produce wildlife food and cover plants. These ratings are based upon limitations imposed by the characteristics or behavior of the soil. These, in turn, limit the potential of the soil to produce wildlife food and cover plants. Four levels of suitability are recognized, and these indicate the degree to which a soil is suitable for a given habitat element.

Suitability of the soils for wildlife

The following definitions are given for habitat suitability ratings used in table 3.

Well suited indicates that habitats generally are easily created, improved, or maintained; that the soil has few or no limitations that affect management; and that satisfactory results can be expected.

Suited indicates that habitats can be created, improved, or maintained in most places; that the soil has moderate limitations that affect management; and that moderate intensity of management and fairly frequent attention may be required for satisfactory results.

Poorly suited indicates that habitats can be created, improved, or maintained in most places; that the soil has rather severe limitations; that habitat management is difficult and expensive and requires intensive effort; and that results are not always satisfactory.

Unsuited indicates that the soil limitation is so extreme that it is impractical, if not impossible, to manage the designated habitat element. Unsatisfactory results are probable. (For short-term usage, soils rated as "poorly suited" may provide easy establishment and temporary values.)

Elements of wildlife habitat

The habitat elements rated in table 3 are defined and exemplified as follows:

Grain and seed crops are agricultural grains or seed-producing annuals planted to produce food for wildlife. Examples are corn, sorghums, millet, soybeans, wheat, oats, and sunflower.

Grasses and legumes are domestic perennial grasses and legumes that can be established by planting and which furnish food and cover for wildlife. Examples are ryegrass and fescue. Typical legumes are clovers, alfalfa, and lespedezas.

Wild herbaceous upland plants are perennial grasses, forbs, and weeds that provide food and cover for wildlife. Examples of these are beggarweed, perennial lespedezas, wildbean, indiangrass, wild ryegrass, and bluestem.

Hardwood trees and shrubs in Dallam County are limited to small areas around abandoned homesteads. Trees are not native to the county.

Wetland food and cover plants are annual and perennial, wild, herbaceous plants in moist to wet sites, exclusive of submerged or floating aquatics, that produce food or cover extensively and are dominantly used by wetland forms of wildlife. Examples are wild millet, bulrush, spikesedge, rushes, sedges, wildrice cutgrass, sourdock, and cattails.

Shallow water developments are low dikes, shallow pits, and water-control structures established to create habitat principally for waterfowl. They may be designed so that they can be drained, planted, and flooded, or they may be used as permanent impoundments to grow submerged aquatics.

Kinds of wildlife

The three kinds of wildlife are defined as follows:

Openland Wildlife.—This group consists of birds and mammals that normally frequent cropland, range, and areas overgrown with grasses, herbs, and weeds. Examples

of this kind of wildlife are quail, antelope, jackrabbit, pheasant, and meadow lark.

Brushland Wildlife.—In this group are birds and mammals that normally frequent wooded areas of hardwood trees and shrubs. In Dallam County, these may be established with the use of extra water. Examples of brushland wildlife are squirrel, raccoon, and songbirds.

Wetland Wildlife.—This group consists of birds and mammals that normally frequent such areas as ponds, playas, and streams. Examples of this kind of wildlife are duck, geese, sandhill crane, shorebirds, and snipe.

Engineering Uses of the Soils [3]

This section provides information of special interest to engineers, contractors, farmers, and others who use soil as structural material or as foundation material upon which structures are built. In this section are discussed those properties of the soil that affect construction and maintenance of roads, airports, pipelines, building foundations, wat er storage facilites, erosion-control structures, and sewage disposal systems. Among the soil properties most important in engineering are permeability, compaction, shear strength, density, shrink-swell potential, water-holding capacity, grain-size distribution, plasticity, and reaction.

Information concerning these and related soil properties is discussed in tables 4 and 5. The estimates and interpretations of soil properties in these tables can be used in:

1. Planning of agricultural farm ponds, irrigation systems, diversion terraces, and other structures for controlling water and conserving soil.
2. Selecting potential locations for highways, airports, pipelines, and underground cables.
3. Locating probable sources of sand, gravel, or rock suitable for use as construction material.
4. Selecting potential industrial, commercial, residential, and recreational areas.

The engineering interpretations reported here do not eliminate the need for sampling and testing at the site of specific engineering works involving heavy loads and where the excavations are deeper than the depths of layers here reported. The estimated values for bearing capacity and traffic-supporting capacity expressed in words should not be assigned specific values. Estimates are generally made to depths of about 5 feet, and interpretations do not apply to greater depths. On the mapping units there are small areas of other soils that may have engineering properties different from those given for the mapping unit. Even in these situations, however, the soil map is useful in planning more detailed field investigations and for indicating the kinds of problems that may be expected.

Some terms used by soil scientists may be unfamiliar to engineers, and some words have different meanings in soil science than they have in engineering. Among the terms that have special meaning in soil science are gravel, sand, silt, clay, loam, surface soil, subsoil, and horizons. These and other terms are defined in the Glossary at the back of this publication.

Depth to bedrock in most soils in Dallam County is well beyond depths to which the soils were investigated in the field mapping. Many logs kept by well drillers indicate that bedrock occurs only in the "red beds," which are 100 to 450 feet below the surface. Kerrick and Plack soils, on the other hand, have indurated caliche at depths of 21 to 40 inches and 4 to 20 inches, respectively. The Kerrick and Plack soils in places are a source of indurated caliche at fairly shallow depths. If the beds are thick enough, this indurated caliche can be mined from open pits with few limitations.

Seasonal high water tables are not a problem in Dallam County. Seasonal flooding occurs on Ness soils, which are in playas, and on bottom lands or low-lying areas where there are Church, Corlena, Humbarger, and Dalupe soils.

Salinity of the soil, which influences corrosivity of uncoated steel, is based on electrical conductivity of the saturated soil extract, which is expressed in millimhos per centimeter at 25° C. Salinity also affects the suitability of a soil for crop production and its stability when used as a construction material. Church soils are the only soils in Dallam County that have salinity to a degree that affects their management. These are in low areas where water occasionally collects and creates a seasonal high water table.

Winter grading is not a major problem in Dallam County. Prolonged periods of cold weather ordinarily are not severe enough to cause soil freezing below a depth of about 6 inches, and freezing seldom reaches to a depth of 18 inches. The soils are frozen for such short periods that freezing is not a serious problem.

Only two kinds of soil in Dallam County are a limited source of sand, the Valentine and Corlena soils. There are no known sources of gravel.

Engineering classification systems

The two systems most commonly used in classifying samples of soil horizons for engineering are the Unified system (*7*) used by Soil Conservation Service engineers, the United States Department of Defense, and others and the AASHO system (*1*) adopted by the American Association of State Highway Officials.

In the Unified system, soils are classified according to particle-size distribution, plasticity index, liquid limit, and organic matter. Soils are grouped in 15 classes. There are eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes are designated by symbols for both classes; for example, ML–CL. The letters used in class designations mean: G, gravel; S, sand; M, silt; and C, clay. Clean sands are identified by SW or SP; sands with fines of silt and clay by SM or SC; silt and clay that have a low liquid limit by ML and CL; and silt and clay that have a high liquid limit by MH and CH.

The AASHO system is used to classify soils according to those properties that affect use in highway construction. In this system, a soil is placed in one of seven basic groups ranging from A–1 through A–7. The groups are established on the basis of grain-size distribution, liquid limit, and plasticity index. In group A–1 are gravelly soils of high shear strength, or the best soils for subgrade (foundation); and at the other extreme, group A–7, are clay soils

[3] By Dan C. Huckabee, area engineer, Soil Conservation Service.

that have low strength when wet. The best soils for subgrade are therefore classified as A–1, the next best A–2, and so on to class A–7, the poorest soil for subgrade. Where laboratory data are available to justify a further breakdown, the A–1, A–2, and A–7 groups are divided as follows: A–1–a, A–1–b, A–2–4, A–2–5, A–2–6, A–2–7, A–7–5, and A–7–6. If soil material is near a classification boundary, it is given a symbol showing both classes; for example, A–2 or A–4. Within each group, the relative engineering value of a soil material can be indicated by a group index number. Group indexes range from 0 for the best material to 20 for the poorest.

The estimated classifications for all soils mapped in the survey are given in table 4.

Engineering properties of the soils

Table 4 provides estimates of soil properties important to engineering. The estimates are based on field classification and descriptions, physical and chemical test data from comparable soils in adjacent areas, and from detailed experience in working with the individual kind of soil in the survey area. No physical and chemical tests were made of the soils in Dallam County.

In the column headed "Hydrologic group," the soils are placed in one of four groups on the basis of intake of water at the end of long-duration storms that occur after prior wetting and opportunity for swelling and without the protective effects of vegetation. The groups range from open

TABLE 3.—*Interpretations of the soils for elements*

Soil series and map symbols	Elements of wildlife habitat		
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants
Berthoud: BeC, BeD	Well suited	Well suited	Well suited
Church: Ch	Poorly suited	Suited	Suited
Conlen: CoB, CoC	Suited	Well suited	Well suited
Corlena: Cr	Poorly suited	Poorly suited	Poorly suited
Dallam: DaB, DlA, DlB	Well suited	Well suited	Well suited
Dalupe: Df	Well suited	Well suited	Well suited
Dumas: DuA, DuB	Well suited	Well suited	Well suited
Gruver: GrA, GrB	Well suited	Well suited	Well suited
Humbarger: Hu	Well suited	Well suited	Well suited
Kerrick: Kp For Plack part of Kp, see Plack series.	Well suited	Well suited	Well suited
Ness: Ne	Poorly suited	Poorly suited	Suited
Perico: PcB, PeA, PeB, PeC	Well suited	Well suited	Well suited
Plack: PlB	Poorly suited	Poorly suited	Suited
Rickmore: RcB, RkA	Well suited	Well suited	Well suited
Sherm: Sh	Well suited	Well suited	Well suited
Spurlock: SpB, SpC, SrB	Well suited	Well suited	Well suited
Sunray: SuA, SuB	Well suited	Well suited	Well suited
Texline: TeA	Well suited	Well suited	Well suited
Valentine: Va, VkE For Spurlock part of VkE, see Spurlock series.	Poorly suited	Poorly suited	Poorly suited
Vingo: VlC For Dallam part of VlC, see Dallam series.	Well suited	Well suited	Well suited

sands (lowest runoff potential—Group A) to heavy clays (highest runoff potential—Group D). Descriptions of these four groups are as follows:

Group A consists of soils that have a high infiltration rate, even when thoroughly wetted. These are chiefly deep, well-drained to excessively drained sand, gravel, or both. These soils have a high rate of water transmission and a low runoff potential.

Group B consists of soils that have a moderate infiltration rate when thoroughly wetted. These are chiefly moderately deep to deep, moderately well drained to well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission and a moderate runoff potential.

Group C consists of soils that have a slow infiltration rate when throughly wetted. They consist chiefly of (1) soils having a layer that impedes the downward movement of water or (2) soils having a moderately fine texture to fine texture and a slow infiltration rate. These soils have a slow rate of water transmission and a high runoff potential.

Group D soils have a very slow infiltration rate when thoroughly wetted and consist chiefly of (1) clay soils having a high swelling potential; (2) soils having a high permanent water table; (3) soils having a claypan or a clay layer at or near the surface; and (4) soils shallow over nearly impervious materials. These soils have a very slow rate of water transmission and a very high runoff potential.

of wildlife habitat and for kinds of wildlife

Elements of wildlife habitat—Continued			Kinds of wildlife		
Hardwood trees and shrubs	Wetland food and cover plants	Shallow-water developments	Openland	Brushland	Wetland
Unsuited	Unsuited	Unsuited	Well suited	Poorly suited	Unsuited.
Unsuited	Well suited	Well suited	Suited	Poorly suited	Well suited.
Unsuited	Unsuited	Unsuited	Well suited	Poorly suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Poorly suited	Poorly suited	Unsuited.
Unsuited	Unsuited	Unsuited	Well suited	Poorly suited	Unsuited.
Unsuited	Unsuited	Unsuited	Well suited	Poorly suited	Unsuited.
Unsuited	Unsuited	Unsuited	Well suited	Poorly suited	Unsuited.
Unsuited	Unsuited	Unsuited	Well suited	Poorly suited	Unsuited.
Unsuited	Unsuited	Unsuited	Well suited	Poorly suited	Unsuited.
Unsuited	Unsuited	Unsuited	Well suited	Poorly suited	Unsuited.
Unsuited	Well suited	Suited	Poorly suited	Poorly suited	Well suited.
Unsuited	Unsuited	Unsuited	Well suited	Poorly suited	Unsuited.
Unsuited	Unsuited	Unsuited	Poorly suited	Poorly suited	Unsuited.
Unsuited	Unsuited	Unsuited	Well suited	Poorly suited	Unsuited.
Unsuited	Unsuited	Unsuited	Well suited	Poorly suited	Unsuited.
Unsuited	Unsuited	Unsuited	Well suited	Poorly suited	Unsuited.
Unsuited	Unsuited	Unsuited	Well suited	Poorly suited	Unsuited.
Unsuited	Unsuited	Unsuited	Well suited	Poorly suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Poorly suited	Poorly suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Well suited	Poorly suited	Unsuited.

TABLE 4.—*Estimated soil*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils in referring to other soils in the first column of this table. The symbol < means "less

Soil series and map symbols	Hydrologic group	Depth from surface	Classification		
			USDA texture	Unified	AASHO
		Inches			
Berthoud: BeC, BeD	B	0–6	Loam	ML–CL	A–4 or A–6
		6–67	Clay loam	CL	A–6
Church: Ch	D	0–7	Clay loam	CL	A–6 or A–7
		7–28	Clay	CH	A–7
		28–60	Clay loam	CL	A–6 or A–7
Conlen: CoB, CoC	B	0–10	Loam	ML or CL	A–6
		10–80	Clay loam	ML or CL	A–6
Corlena: Cr	A	0–70	Loamy fine sand	SM	A–2–4
Dallam: DaB, DlA, DlB	B	0–8	Fine sandy loam	SM	A–4
		8–57	Sandy clay loam	CL or SC	A–6 or A–4
		57–94	Clay loam	CL	A–6
Dalupe: Df	B	0–60	Fine sandy loam	SM	A–4 or A–2
Dumas: DuA, DuB	B	0–6	Loam	CL–ML, CL	A–4
		6–36	Clay loam	CL	A–6
		36–104	Clay loam and sandy clay loam.	CL	A–4 or A–6
Gruver: GrA, GrB	C	0–7	Loam	CL	A–6
		7–72	Clay loam	CL	A–7 or A–6
		72–92	Sandy clay loam	CL	A–6 or A–7
Humbarger: Hu	B	0–65	Loam, clay loam, sandy clay loam.	CL, ML–CL	A–6
*Kerrick: Kp	B	0–10	Loam	CL, ML–CL	A–6, A–4
		10–31	Clay loam	CL, ML–CL	A–6
For Plack part of Kp, see Plack series.		31–60	Indurated platy caliche.		
Ness: Ne	D	0–65	Clay	CH	A–7
Perico: PcB, PeA, PeB, PeC	B	0–7	Fine sandy loam	SM	A–4 or A–2
		7–69	Sandy clay loam	CL, SC	A–6
		69–88	Clay loam	CL	A–6
Plack: PlB	D	0–8	Loam	CL, ML–CL	A–6, A–4
		8–50	Indurated platy caliche.		
Rickmore: RcB, RkA	C	0–8	Fine sandy loam	SM, ML	A–4, A–2
		8–38	Clay loam and sandy clay loam.	CL	A–6 or A–7
		38–90	Clay loam	CL	A–6 or A–7
Sherm: Sh	D	0–10	Clay loam	CL	A–6
		10–60	Clay	CH, CL	A–7
		60–100	Clay loam	CL	A–6
Spurlock: SpB, SpC, SrB	B	0–6	Fine sandy loam	SM, ML–CL, CL	A–4, A–6
		6–90	Clay loam and sandy clay loam.	CL, ML, ML–CL	A–6, A–4
Sunray: SuA, SuB	B	0–10	Loam	ML–CL, CL	A–6
		10–80	Clay loam	CL, ML–CL	A–6, A–7
Texline: TeA	B	0–10	Loam	CL–ML, CL	A–4
		10–38	Clay loam	CL	A–6
		38–85	Sandy clay loam	CL	A–6
*Valentine: Va, VkE	A	0–60	Fine sand	SP, SM	A–2
For Spurlock part of VkE, see Spurlock series.					

properties significant to engineering

such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions for than." Absence of entry in a column indicates that properties were too variable to rate]

Percentage passing sieve—				Permeability	Available water capacity	Reaction	Shrink-swell potential
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)				
				Inches per hour	*Inches per inch of soil*	*pH*	
100	100	100	55–85	0. 63–2. 0	0. 12–0. 16	7. 9–8. 4	Low.
100	100	100	65–85	0. 63–2. 0	0. 14–0. 16	7. 9–8. 4	Low.
100	100	100	80–90	0. 63–2. 0	0. 10–0. 15	8. 5–9. 0	Moderate.
100	100	100	80–90	<0. 06	0. 08–0. 13	8. 5–9. 0	High.
100	100	100	80–90	0. 2–0. 63	0. 07–0. 12	8. 5–9. 0	Moderate.
100	95–98	85–95	55–70	0. 63–2. 0	0. 14–0. 18	7. 9–8. 4	Low.
100	85–98	85–95	50–80	0. 63–2. 0	0. 12–0. 16	7. 9–8. 4	Low.
100	95–100	60–80	15–30	6. 3–20. 0	0. 05–0. 10	7. 9–8. 4	Low.
100	100	70–85	35–50	2. 0–6. 3	0. 10–0. 14	6. 6–7. 3	Low.
100	100	80–95	45–70	0. 63–2. 0	0. 14–0. 18	7. 4–8. 4	Low.
100	100	80–95	50–75	0. 63–2. 0	0. 12–0. 16	7. 9–8. 4	Low.
100	100	60–80	30–45	2. 0–6. 3	0. 10–0. 16	7. 9–8. 4	Low.
100	100	95–100	55–75	0. 63–2. 0	0. 12–0. 16	6. 6–7. 3	Low.
100	100	95–100	70–85	0. 63–2. 0	0. 14–0. 18	7. 4–8. 4	Low.
100	100	85–95	60–75	0. 63–2. 0	0. 12–0. 16	7. 9–8. 4	Low.
100	100	85–95	55–75	0. 63–2. 0	0. 15–0. 18	6. 6–7. 3	Low.
100	100	100	94–98	0. 2–0. 63	0. 16–0. 20	6. 6–8. 4	Moderate.
95–100	95–100	85–100	85–98	0. 2–0. 63	0. 14–0. 18	7. 9–8. 4	Low.
95–100	90–100	80–95	55–80	0. 63–2. 0	0. 15–0. 19	7. 9–8. 4	Moderate.
100	100	90–100	50–70	0. 63–2. 0	0. 12–0. 16	7. 9–8. 4	Low.
100	100	90–100	60–80	0. 63–2. 0	0. 10–0. 17	7. 9–8. 4	Low.
100	100	96–100	80–95	<0. 06	0. 15–0. 17	7. 4–8. 4	High.
100	96–100	95–99	20–50	2. 0–6. 3	0. 10–0. 14	7. 9–8. 4	Low.
100	100	95–100	45–70	0. 63–2. 0	0. 12–0. 16	7. 9–8. 4	Low.
100	96–100	95–100	50–75	0. 63–2. 0	0. 12–0. 16	7. 9–8. 4	Low.
95–100	95–100	85–95	50–70	0. 63–2. 0	0. 10–0. 14	7. 9–8. 4	Low.
100	98–100	95–100	20–55	2. 0–6. 3	0. 08–0. 12	6. 6–7. 3	Low.
100	100	100	60–80	0. 2–0. 63	0. 15–0. 19	6. 6–8. 4	Moderate.
95–100	95–100	85–100	50–75	0. 2–0. 63	0. 12–0. 16	7. 9–8. 4	Moderate.
100	100	100	85–95	0. 06–0. 02	0. 16–0. 20	6. 6–7. 3	Moderate.
100	100	100	80–99	<0. 06	0. 16–0. 19	7. 4–8. 4	High.
100	95–100	94–99	50–75	0. 2–0. 63	0. 13–0. 17	7. 9–8. 4	Moderate.
100	95–100	85–95	35–70	0. 63–2. 0	0. 12–0. 16	7. 9–8. 4	Low.
100	85–95	85–95	50–75	0. 63–2. 0	0. 12–0. 16	7. 9–8. 4	Low.
100	100	95–100	50–75	0. 63–2. 0	0. 14–0. 16	7. 9–8. 4	Low.
95–100	95–100	90–100	65–80	0. 63–2. 0	0. 12–0. 16	7. 9–8. 4	Low.
100	100	95–100	50–75	0. 63–2. 0	0. 12–0. 16	7. 9–8. 4	Low.
98–100	98–100	95–100	65–80	0. 63–2. 0	0. 14–0. 18	7. 9–8. 4	Moderate.
100	100	95–100	60–75	0. 63–2. 0	0. 14–0. 18	7. 9–8. 4	Low.
100	100	95–100	0–15	6. 3–20. 0	0. 04–0. 10	6. 6–8. 4	Low.

TABLE 4.—*Estimated soil properties*

Soil series and map symbols	Hydrologic group	Depth from surface	Classification		
			USDA texture	Unified	AASHO
*Vingo: VIC For Dallam part of VIC, see Dallam series.	B	*Inches* 0–18 18–48 48–100	Loamy fine sand Fine sandy loam Sandy clay loam	SM SM SC	A–2 A–2 or A–4 A–4 or A–6

TABLE 5.—*Interpretations of*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soils. The soil for referring to other soils in

Soil series and map symbols	Suitability as source of—		Degree of limitations and soil features affecting—		
	Topsoil [1]	Road fill	Highway location	Foundations for low buildings	Septic tank filter fields
Berthoud: BeC, BeD	Fair: 6 to 10 inches of loam.	Fair: fair traffic-supporting capacity.	Moderate: fair traffic-supporting capacity.	Slight where slopes are 3 to 6 percent. Moderate where slopes are 6 to 8 percent.	Slight where slopes are 3 to 5 percent. Moderate where slopes are 5 to 8 percent.
Church: Ch	Poor: high salinity.	Poor: high shrink-swell potential; poor traffic-supporting capacity.	Severe: high shrink-swell potential; poor traffic-supporting capacity.	Severe: high shrink-swell potential.	Severe: very slow permeability.
Conlen: CoB, CoC	Fair: 9 to 12 inches of loam.	Fair: fair traffic-supporting capacity.	Moderate: fair traffic-supporting capacity.	Slight	Slight
Corlena: Cr	Poor: loamy fine sand throughout.	Good	Severe: flooding hazard.	Severe: flooding hazard.	Severe: flooding hazard.
Dallam: DaB DlA, DlB,	Fair where surface layer is 6 to 12 inches of fine sandy loam. Poor where surface layer is loamy fine sand.	Fair: fair traffic-supporting capacity.	Moderate: fair traffic-supporting capacity.	Slight	Slight

See footnote at end of table.

significant to engineering—Continued

Percentage passing sieve—				Permeability	Available water capacity	Reaction	Shrink-swell potential
No. 4 (4. 7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)				
				Inches per hour	*Inches per inch of soil*	*pH*	
100	100	70–90	15–35	6. 3–20. 0	0. 06–0. 10	6. 6–7. 3	Low.
100	100	80–95	30–45	2. 0–6. 3	0. 10–0. 14	6. 6–7. 3	Low.
100	100	80–95	35–50	0. 63–2. 0	0. 11–0. 15	7. 9–8. 4	Low.

engineering properties of the soils

in such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions the first column of this table]

Degree of limitations and soil features affecting—Con.			Soil features affecting—			Degree of corrosivity and contributing soil features
Sewage lagoons	Farm ponds		Irrigation	Terraces and diversions	Waterways	Uncoated steel
	Reservoir area	Embankments				
Moderate where slopes are 3 to 7 percent; moderate permeability. Severe where slopes are 7 to 8 percent.	Moderate: moderate permeability.	Moderate: poor resistance to piping and erosion.	Slopes of 3 to 8 percent.	Erodible; unstable.	Erodible	Low.
Slight	Slight	Moderate: fair slope stability.	High salinity; very slow permeability.	Depressional relief.	High salinity; clayey material.	High: high salinity.
Moderate: moderate permeability.	Severe: moderate permeability.	Moderate: fair resistance to piping and erosion.	All features favorable.	All features favorable.	Erodible	Moderate: clay loam.
Severe: rapid permeability.	Severe: rapid permeability.	Moderate: poor resistance to piping and erosion.	Rapid permeability.	Erodible; unstable sand.	Subject to soil blowing.	Low.
Moderate: moderate permeability.	Moderate: moderate permeability.	Moderate: poor resistance to piping and erosion.	All features favorable.	All features favorable.	Subject to soil blowing.	Moderate: sandy clay loam.

TABLE 5.—*Interpretations of engineering*

Soil series and map symbols	Suitability as source of—		Degree of limitations and soil features affecting—		
	Topsoil [1]	Road fill	Highway location	Foundations for low buildings	Septic tank filter fields
Dalupe: Df	Good	Good	Severe: flooding hazard.	Severe: flooding hazard.	Severe: flooding hazard.
Dumas: DuA, DuB	Fair: 6 to 12 inches of loam.	Fair: fair traffic-supporting capacity.	Moderate: fair traffic-supporting capacity.	Slight	Moderate: moderate permeability.
Gruver: GrA, GrB	Fair: 6 to 10 inches of loam.	Fair: fair traffic-supporting capacity; moderate shrink-swell potential.	Moderate: fair traffic-supporting capacity; moderate shrink-swell potential.	Moderate: moderate shrink-swell potential.	Severe: moderately slow permeability.
Humbarger: Hu	Good	Fair: fair traffic-supporting capacity; moderate shrink-swell potential.	Moderate: flood hazard.	Severe: flooding hazard.	Severe: flooding hazard.
*Kerrick: Kp For Plack part of Kp, see Plack series.	Fair: 8 to 14 inches of loam.	Fair where indurated caliche is at a depth of 24 to 40 inches. Poor where indurated caliche is at a depth of 21 to 24 inches.	Moderate where indurated caliche is at a depth of 36 to 40 inches. Severe where indurated caliche is at a depth of 21 to 36 inches.	Slight	Severe: indurated caliche at a depth of 21 to 40 inches.
Ness: Ne	Poor: clay throughout.	Poor: high shrink-swell potential.	Severe: flooding hazard.	Severe: flooding hazard.	Severe: very slow permeability.
Perico: PcB, PeA, PeB, PeC	Poor where 4 to 6 inches of fine sandy loam or where loamy fine sand. Fair where 6 to 15 inches of fine sandy loam.	Fair: fair traffic-supporting capacity.	Moderate: fair traffic-supporting capacity.	Slight	Slight
Plack: PlB	Poor where 4 to 6 inches of loam. Fair where 6 to 20 inches of loam.	Poor: 4 to 20 inches of material.	Severe: indurated caliche at a depth of 4 to 20 inches.	Severe: indurated caliche at a depth of 4 to 20 inches.	Severe: indurated caliche at a depth of 4 to 20 inches.

See footnote at end of table.

properties of the soils—Continued

Degree of limitations and soil features affecting—Con.			Soil features affecting—			Degree of corrosivity and contributing soil features
Sewage lagoons	Farm ponds		Irrigation	Terraces and diversions	Waterways	Uncoated steel
	Reservoir area	Embankments				
Severe: moderately rapid permeability.	Severe: moderately rapid permeability.	Moderate: poor resistance to piping and erosion.	Moderately rapid permeability.	Flooding hazard.	Flooding hazard.	Low.
Moderate: moderate permeability.	Moderate: moderate permeability.	Moderate: fair resistance to piping and erosion.	All features favorable.	All features favorable.	All features favorable.	Moderate: clay loam; resistivity.
Slight	Moderate: moderately slow permeability.	Moderate: fair resistance to piping and erosion.	All features favorable.	All features favorable.	All features favorable.	High: resistivity.
Moderate: moderate permeability.	Moderate: moderate permeability.	Moderate: fair stability; poor resistance to piping and erosion.	Flooding hazard.	Flooding hazard.	All features favorable.	Moderate: sandy clay loam.
Severe: indurated caliche at a depth of 21 to 40 inches.	Moderate where indurated caliche is at a depth of 36 to 40 inches. Severe where indurated caliche is at a depth of 21 to 36 inches.	Moderate where there is 24 to 40 inches of material. Severe where there is 21 to 24 inches of material; poor resistance to piping and erosion.	Indurated caliche at a depth of 21 to 40 inches.	Indurated caliche at a depth of 21 to 40 inches.	Indurated caliche at a depth of 21 to 40 inches.	Moderate: clay loam.
Slight	Slight	Moderate: fair slope stability.	Very slow permeability.	Depressional	Depressional	High: poorly drained.
Moderate: moderate permeability.	Moderate: moderate permeability.	Moderate: fair resistance to piping and erosion.	Moderate permeability.	Soil blowing	Soil blowing	Moderate: sandy clay loam.
Severe: indurated caliche at a depth of 4 to 20 inches.	Severe: indurated caliche at a depth of 4 to 20 inches.	Severe: 4 to 20 inches of material.	Indurated caliche at a depth of 4 to 20 inches.	Indurated caliche at a depth of 4 to 20 inches.	Indurated caliche at a depth of 4 to 20 inches.	Moderate: corrosivity.

TABLE 5.—*Interpretations of engineering*

Soil series and map symbols	Suitability as source of—		Degree of limitations and soil features affecting—		
	Topsoil [1]	Road fill	Highway location	Foundations for low buildings	Septic tank filter fields
Rickmore: RcB, RkA	Poor where 4 to 6 inches of fine sandy loam or where loamy fine sand. Fair where 6 to 10 inches of fine sandy loam.	Fair: moderate shrink-swell potential; fair traffic-supporting capacity.	Moderate: fair traffic-supporting capacity; moderate shrink-swell potential.	Moderate: moderate shrink-swell potential.	Severe: moderately slow permeability.
Sherm: Sh	Fair: clay loam	Poor: high shrink-swell potential; poor traffic-supporting capacity.	Severe: high shrink-swell potential; poor traffic-supporting capacity.	Severe: high shrink-swell potential.	Severe: very slow permeability.
Spurlock: SpB, SpC, SrB	Poor where 5 to 6 inches of fine sandy loam. Fair where 6 to 8 inches of fine sandy loam.	Fair: fair traffic-supporting capacity.	Moderate: fair traffic-supporting capacity.	Slight	Slight
Sunray: SuA, SuB	Fair: 9 to 14 inches of loam.	Fair: fair traffic-supporting capacity.	Moderate: fair traffic-supporting capacity.	Slight	Slight
Texline: TeA	Fair: 10 to 19 inches of loam.	Fair: fair traffic-supporting capacity; moderate shrink-swell potential.	Moderate: fair traffic-supporting capacity; moderate shrink-swell potential.	Moderate: moderate shrink-swell potential.	Slight
*Valentine: Va, VkE. For Spurlock part of VkE, see Spurlock series.	Poor: fine sand throughout.	Good	Slight	Slight	Slight
*Vingo: VIC. For Dallam part of VIC, see Dallam series.	Poor: loamy fine sand.	Good	Slight	Slight	Slight

[1] Unless otherwise noted, the ratings apply to the surface layer.

properties of the soils—Continued

Degree of limitations and soil features affecting—Con.			Soil features affecting—			Degree of corrosivity and contributing soil features
Sewage lagoons	Farm ponds		Irrigation	Terraces and diversions	Waterways	Uncoated steel
	Reservoir area	Embankments				
Slight where slopes are 0 to 2 percent. Moderate where slopes are 2 to 3 percent.	Moderate: moderately slow permeability.	Moderate: poor resistance to piping and erosion.	All features favorable.	All features favorable.	All features favorable.	Moderate: clay loam.
Slight	Slight	Moderate: fair slope stability.	Very slow permeability.	All features favorable.	All features favorable.	High: clay.
Moderate: moderate permeability.	Moderate: moderate permeability.	Moderate: poor resistance to piping and erosion.	Moderate permeability.	Soil blowing	Soil blowing	Moderate: clay loam.
Moderate: moderate permeability.	Moderate: moderate permeability.	Moderate: poor resistance to piping and erosion.	All features favorable.	All features favorable.	All features favorable.	Moderate: clay loam.
Moderate: moderate permeability.	Moderate: moderate permeability.	Moderate: poor resistance to piping and erosion.	All features favorable.	All features favorable.	All features favorable.	Moderate: clay loam.
Severe: rapid permeability.	Severe: rapid permeability.	Severe: poor resistance to piping and erosion; poor slope stability.	Rapid permeability.	Soil blowing	Soil blowing	Low.
Severe: moderately rapid permeability.	Severe: moderately rapid permeability.	Moderate: poor resistance to piping and erosion.	Moderately rapid permeability.	Soil blowing	Soil blowing	Low.

In the column headed "Depth from surface," the depth, in inches, is given for the major distinctive layers of the soil profile.

USDA texture is determined by the relative proportions of sand, silt, and clay in soil material that is less than 2.0 millimeters in diameter. "Sand," "silt," "clay," and other terms used in the USDA textural classification are defined in the Glossary of this survey.

For some soils, a range is given for both AASHO and Unified systems, because each of these soils has a defined range in properties. Ratings by these two systems are useful in determining suitability of a soil as a source of material for construction purposes. The estimated amount of soil material passing sieves of specified sizes is given as a range in percentage if less than 100 percent passes the sieve.

Permeability, as used in table 4, relates only to movement of water downward through undisturbed and uncompacted soil. It does not include lateral seepage. The estimates are based on structure and porosity of the soil. Plowpans, crusts at the surface, and other properties resulting from use of the soils are not considered.

Available water capacity is the amount of water a soil can hold and make available to plants. It is the numerical difference between the percentage of water at field capacity and the percentage of water at the time plants wilt. The rate is expressed as inches of water per inch of soil depth.

Reaction is the degree of acidity or alkalinity of a soil, expressed as a pH value. Soil reaction and relative terms used to describe pH values are explained in the Glossary.

Shrink-swell potential is an indication of the volume change to be expected of the soil material with changes in moisture content. Shrinking and swelling of soils cause much damage to building foundations, roads, and other structures. A high shrink-swell potential indicates hazards to the maintenance of structures constructed in, on, or with such materials.

Engineering interpretations of the soils

Table 5 contains selected information useful to engineers and others who plan to use soil material in construction of highways, farm facilities, buildings, and sewage disposal systems. Detrimental or undesirable features are emphasized in this table. The ratings and other interpretations in this table are based on estimated engineering properties of the soils in table 4, on available test data, and on field experience. Although the information applies only to soil depths indicated in table 4, it is reasonably reliable to depths of about 6 feet for most soils, and to depths of several more feet for some. Following are explanations of the terms in table 5.

Topsoil is the term used to designate a fertile soil or soil material, ordinarily rich in organic matter, used as a topdressing for lawns, roadbanks, gardens, and the like. The ratings indicate suitability for such uses. Ordinarily, only the surface layer is removed for topsoil, but other layers may also be suitable.

Road fill is the material used to build embankments. The ratings indicate performance of soil material moved from borrow areas for this purpose.

Highway location is influenced by features of the undisturbed soil that affect construction and maintenance of highways. The soil features, favorable as well as unfavorable, are the main ones affecting geographic location of highways and rated in table 5.

Foundations for low buildings are affected chiefly by features of the undisturbed soil that are used to support foundation footings of houses or other low buildings no higher than three stories. Footings are assumed to be one foot wide and at a minimum depth of one foot.

Septic tank filter fields are affected mainly by seepage loss, location of water table, and susceptibility of the soil to flooding. The degree of limitation and chief reasons for assigning moderate to severe ratings are given.

Sewage lagoons are influenced by soil features such as seepage loss, location of water table, and depth to bedrock. The degree of limitation and chief reasons for assigning moderate or severe ratings are given.

Farm pond reservoir areas are affected mainly by seepage loss of water, and the soil features are those that influence such seepage.

Farm pond embankments serve as dams. The soil features of both subsoil and substratum are those important to the use of soil for constructing embankments.

Irrigation is influenced by such soil features as slope, permeability, thickness of the soil, and potential flood hazard that might wash out irrigation structures.

Terraces and diversions are affected by such soil features as depth, topography, and danger of soil blowing. These structures are not used on all soils.

Waterways are natural or shaped watercourses, covered with a close-growing grass, that are used to carry excess water from terrace systems. Soil features affecting waterways are soil depth, flood hazard, and the hazard of soil blowing.

Corrosivity indicates the potential danger to uncoated steel or concrete structures through chemical action that dissolves or weakens the structural material. Structural materials may corrode when buried in soil, and a given material corrodes in some soils more rapidly than in others. Extensive installations that intersect soil boundaries or soil horizons are more likely to be damaged by corrosion than are installations entirely in one kind of soil or soil horizon. Table 5 lists only the corrosivity and soil features affecting uncoated steel. The Church soils present the only corrosivity problem to concrete in Dallam County. Soils are rated for corrosivity at a depth of 4 feet, and the estimated corrosivity is based on soil texture and drainage.

Use of the Soils for Recreation

This section is for landowners, engineers, and others who plan and develop recreation areas.

Table 6 contains information on soil limitations to be considered when planning camp areas, picnic areas, paths and trails, and playgrounds. Other useful information is contained in table 5 and in the section, "Engineering interpretations of the soils."

The interpretations given in tables 5 and 6 do not eliminate the need for onsite investigations. The nature and intensity of onsite investigations can be planned as indicated by the soil map and the soil interpretations given in the tables.

Camp areas are those sites used intensively for tents and small camp trailers and the accompanying activities of outdoor living. Among the soil factors considered in rating

TABLE 6.—*Limitations of the soils for recreational uses*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils in such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions for referring to other soils in the first column of this table]

Soil series and map symbols	Camp areas	Picnic areas	Paths and trails	Playgrounds
Berthoud: BeC, BeD	Slight	Slight	Slight	Moderate where slopes are 3 to 5 percent. Severe where slopes are 6 to 8 percent.
Church: Ch	Severe: very slow permeability.	Moderate: moderately well drained.	Moderate: clay loam surface layer.	Severe: very slow permeability.
Conlen: CoB, CoC	Slight	Slight	Slight	Slight where slopes are 0 to 2 percent. Moderate where slopes are 2 to 5 percent.
Corlena: Cr	Moderate: loamy sand surface layer.	Moderate: loamy sand surface layer.	Moderate: loamy sand surface layer.	Moderate: loamy sand surface layer.
Dallam: DaB, DlA, DlB.	Slight where surface layer is fine sandy loam. Moderate where surface layer is loamy fine sand.	Slight where surface layer is fine sandy loam. Moderate where surface layer is loamy fine sand.	Slight where surface layer is fine sandy loam. Moderate where surface layer is loamy fine sand.	Slight where slopes are 0 to 2 percent. Moderate where slopes are 2 to 3 percent; loamy fine sand surface layer.
Dalupe: Df	Moderate: flooding hazard.	Slight	Slight	Moderate: flooding hazard.
Dumas: DuA, DuB	Slight	Slight	Slight	Slight where slopes are 0 to 2 percent. Moderate where slopes are 2 to 3 percent.
Gruver: GrA, GrB	Moderate: moderately slow permeability.	Slight	Slight	Moderate: moderately slow permeability.
Humbarger: Hu	Severe: flooding hazard.	Moderate: flooding hazard.	Slight	Moderate: flooding hazard.
*Kerrick: Kp For Plack part of Kp, see Plack series.	Slight	Slight	Slight	Moderate: indurated caliche at a depth of 21 to 40 inches.
Ness: Ne	Severe: poorly drained	Severe: poorly drained	Severe: poorly drained	Severe: poorly drained.
Perico: PcB, PeA, PeB, PeC.	Slight where surface layer is fine sandy loam. Moderate where surface layer is loamy fine sand.	Slight where surface layer is fine sandy loam. Moderate where surface layer is loamy fine sand.	Slight where surface layer is fine sandy loam. Moderate where surface layer is loamy fine sand.	Slight where slopes are 0 to 2 percent. Moderate where slopes are 2 to 5 percent; loamy fine sand surface layer.
Plack: PlB	Slight	Slight	Slight	Severe: indurated caliche at a depth of 4 to 20 inches.
Rickmore: RcB, RkA	Moderate: moderately slow permeability.	Slight where surface layer is fine sandy loam. Moderate where surface layer is loamy fine sand.	Slight where surface layer is fine sandy loam. Moderate where surface layer is loamy fine sand.	Moderate: moderately slow permeability.
Sherm: Sh	Severe: very slow permeability.	Moderate: clay loam surface layer.	Moderate: clay loam surface layer.	Severe: very slow permeability.

TABLE 6.—*Limitations of the soils for recreational uses*—Continued

Soil series and map symbols	Camp areas	Picnic areas	Paths and trails	Playgrounds
Spurlock: SpB, SpC, SrB.	Slight	Slight	Slight	Slight where slopes are 0 to 2 percent. Moderate where slopes are 2 to 5 percent.
Sunray: SuA, SuB	Slight	Slight	Slight	Slight where slopes are 0 to 2 percent. Moderate where slopes are 2 to 3 percent.
Texline: TeA	Slight	Slight	Slight	Slight.
*Valentine: Va, VkE. For Spurlock part of VkE, see Spurlock series.	Severe: fine sand surface layer.	Severe: fine sand surface layer.	Severe: fine sand surface layer.	Severe: fine sand surface layer.
*Vingo: VIC. For Dallam part of VIC, see Dallam series.	Moderate: loamy fine sand surface layer.	Moderate: loamy fine sand surface layer.	Moderate: loamy fine sand surface layer.	Severe: loamy fine sand surface layer; slopes are 6 to 8 percent.

these camp areas are wetness, slope, permeability, and texture of the surface soil.

Picnic areas are those areas used for park-type picnics. Soil features considered in rating the suitability of the soils are wetness, flood hazard, slope, and texture of the surface soil.

Paths and trails are areas to be used for local and cross-country foot paths and trails and for bridle paths. Factors considered in rating the suitability of the soils are drainage, flooding, slope, and texture of the surface soil.

Playgrounds are those areas that are used intensively for play, such as baseball, football, badminton, and other organized games. Soil features considered in rating are wetness, flood hazard, slope, permeability, texture of the surface soil, and depth to bedrock.

The soil limitations are rated as slight, moderate, or severe for outdoor recreation uses. When soil limitations are moderate or severe, the factors responsible for the rating are given.

Use of the Soils in Town and Country Planning

Residential development, the accompanying extension of public utilities, and the establishment of business and recreational facilities create a need for soil information that is somewhat different from that needed for agricultural purposes. Land appraisers, community planners, builders, and others need to have facts that help them to know which sites are suitable for homes or other buildings and which areas can be reserved for other uses. Homeowners want to landscape their property and to protect it against the hazard of erosion caused by extra runoff from paved areas.

Residential areas in Dallam County cover only a few thousand acres. This section of the survey is brief and confined to materials which may be extracted from other sections of this report.

Those considering homesites can study the general soil map to determine the kind of soil in planned building areas. They can then go to table 5, "Interpretations of engineering properties of the soils," to determine the suitability of topsoil, the suitability of the soil for road fill, and the degree of limitation and the soil features affecting foundations for low buildings, septic tank filter fields, and sewage lagoons. In extending public utilities, the corrosivity of the material being used should be considered. The next step is onsite investigation, an essential part of site selection. The nature and intensity of onsite investigations can be planned as indicated by the general soil map and the accompanying soil interpretations.

The soil survey is not intended to solve problems, but it is to be used for planning and as a starting point for onsite investigations. This does not lessen the usefulness of the survey, because the soil information can be carried from the planning stage and applied to the specific job at hand.

Building usually means the natural vegetation is removed. Large expanses are covered with pavement and structures. This results in more runoff, and frequently the pattern of runoff is changed. The unusual amount and altered pattern of runoff in built-up areas may result in severe erosion of homesites unless measures are taken to keep the water spread out and moving slowly, or unless it is diverted from areas where it could cause damage. Among the practical ways for protection of small residential tracts are the following: (1) Placement of driveways, walks, and fences on the contour or, if that is not feasible, straight across the slope. (2) Grading of the surface so that it is level or gently sloping. Before grading is begun, the top layer should be removed and stockpiled, so that it can be replaced on the graded surface. (3) Construction of diversions that will intercept runoff and keep it from flowing across erodible areas. (4) Construction or improvement of waterways. Heavy runoff in built-up areas can turn natural waterways into gullies. Shaping, smoothing, and es-

tablishing adapted grasses help control gullying. In some cases it may be practical to line small waterways with concrete. (5) Avoid using poorly drained or flooded soils unless adequate drainage is provided.

Formation and Classification of the Soils

This section discusses the five factors of soil formation and the process of horizon differentiation. It also describes briefly the system of classification, and shows how the soils of Dallam County have been classified.

Formation of the Soils

The five major factors of soil formation are parent material, climate, living organisms (especially vegetation), relief, and time. The kind of soil that forms in one area differs from the kind of soil that forms in another area if there has been a difference between the two areas in one or more of the major factors.

Parent material

The soils of Dallam County formed in moderately fine textured, calcareous, wind-deposited sediments that are moderately alkaline. These sediments were derived mostly from alluvial outwash from the Rocky Mountains and have been partially reworked by wind.

Dallam and Perico soils are among those that formed in a fairly thick mantle of ancient alluvial outwash. Corlena and Dalupe soils are examples of soils that formed in recent alluvium. Valentine and Vingo soils are examples of those formed in wind-deposited, sandy material.

Climate

The climate of Dallam County is of the dry steppe type, characterized by mild winters. It is uniform, but its effects have been modified locally by relief and runoff. Because rainfall is low and there are long, dry periods, soil development is slow. The soils are seldom wet below the root zone; and, as a result, many have a horizon of soft powdery lime accumulation. Leaching has not removed free lime from the upper layers of Conlen, Sunray, or other young soils.

Living organisms

Plants, micro-organisms, earthworms, and other forms of animal life are important in the formation of soils. The kinds and amounts of plants are determined partly by the climate and parent material. The vegetation in this county is mostly grass, but there are some brushy plants. The grasses are tall or short, depending on the kind of parent material. Vingo and Dallam soils, which have sandy parent material, support tall grasses; Sherm clay loam, which has a parent material much higher in clay content, supports short grasses.

The prairie type of vegetation contributes large amounts of organic matter to the soil. Grass, leaves, and stems fall on the surface, decay, and darken the surface soil. Roots decompose and distribute organic matter throughout the solum and provide food for earthworms and micro-organisms. Prairie dogs and other burrowing rodents offset the leaching of soluble minerals by moving soil material from various depths to the surface. These animals also destroy natural soil structure and provide enlarged channels for water and air distribution within the soils.

Man also has influenced soil formation by fencing the range and allowing it to be overgrazed, changing the vegetation, and plowing the soils for crops. He has clean harvested the crops and has not controlled runoff and soil blowing. Because of these practices, organic matter has been depleted, and silt and clay particles have been blown from the plow layer. Heavy machinery and untimely tillage have compacted the soils and have slowed the infiltration of water and air. Irrigation has drastically changed the natural moisture regime in some areas.

Relief

Relief influences soil formation through its effects on drainage and runoff. If other factors of soil formation are equal, the degree of profile development depends on the amount of water that enters a soil. For example, Conlen, Perico, and Sherm soils are on uplands. Conlen and Perico soils are mostly in more sloping areas than Sherm soils and normally have a less developed profile than Sherm soils. The formation of soils on steep slopes is retarded by continuous erosion.

Relief also affects the kind and amount of vegetation on a soil, but it is of little importance in Dallam County. Soils on north-facing slopes receive less sunlight than those on south-facing slopes and consequently lose less moisture through evaporation. As a result, those on north slopes have the densest vegetation and generally are the more strongly developed. For the same reason, soils that face east are better developed than those that face west.

Time

The characteristics of a soil are determined mainly by the length of time that the soil-forming factors have been active. A long time generally is required for the formation of well-defined, genetically related horizons. Dumas and Gruver soils are examples of soils that have been in place a long time and have approached equilibrium with their environment. They are mature soils and show marked horizon differentiation. Examples of young soils that have weakly developed profiles are Humbarger soils on bottom lands and Berthoud soils on slopes below the caprock escarpment.

Classification of the Soils

Soils are classified so that we can more easily remember their significant characteristics, assemble knowledge about them, see their relationship to one another and to the whole environment, and understand their behavior and their response to manipulation. First through classification and then through use of the soil maps, we can apply our knowledge of soils to specific fields and other tracts of land.

The current system of classification was adopted by the National Cooperative Soil Survey, effective March 1967. The system has six categories. Beginning with the most inclusive, the categories are order, suborder, great group, subgroup, family, and series. Soil series are revised during the

correlation on the basis of information collected during the course of the survey. The placement of some soil series in the current system, particularly in families, may change as more precise information becomes available. Readers interested in the development of the system should refer to the latest literature available (*4*, *5*). Table 7 shows the classification of the soils in this county according to the family, subgroup, and order.

Climate [4]

Dallam County is in the High Plains at altitudes of 3,800 to 4,600 feet above sea level. The county is in a cool-temperate climatic zone; it has a dry steppe type of climate

[4] By ROBERT B. ORTON, State climatologist, National Weather Service, U.S. Department of Commerce.

TABLE 7.—*Classification of the soils*

Series	Family	Suborder	Order
Berthoud	Fine-loamy, mixed, mesic	Aridic Ustochrepts	Inceptisols.
Church	Fine, mixed, mesic	Aquic Camborthids	Aridisols.
Conlen	Fine-loamy, carbonatic, mesic	Aridic Calciustolls	Mollisols.
Corlena	Sandy, mixed, mesic	Typic Ustifluvents	Entisols.
Dallam	Fine-loamy, mixed, mesic	Aridic Paleustalfs	Alfisols.
Dalupe	Coarse-loamy, mixed, mesic	Fluventic Ustochrepts	Inceptisols.
Dumas	Fine-loamy, mixed, mesic	Aridic Paleustolls	Mollisols.
Gruver	Fine, mixed, mesic	Aridic Paleustolls	Mollisols.
Humbarger	Fine-loamy, mixed, mesic	Cumulic Haplustolls	Mollisols.
Kerrick	Fine-loamy, mixed, mesic	Petrocalcic Calciustolls	Mollisols.
Ness	Fine, montmorillonitic, mesic	Udic Pellusterts	Vertisols.
Perico	Fine-loamy, mixed, mesic	Aridic Paleustalfs	Alfisols.
Plack	Loamy, mixed, mesic, shallow	Petrocalcic Calciustolls	Mollisols.
Rickmore	Fine, mixed, mesic	Aridic Paleustalfs	Alfisols.
Sherm	Fine, mixed, mesic	Torrertic Paleustolls	Mollisols.
Spurlock	Coarse-loamy, carbonatic, mesic	Aridic Ustochrepts	Inceptisols.
Sunray	Fine-loamy, mixed, mesic	Calciorthidic Paleustolls	Mollisols.
Texline	Fine-loamy, mixed, mesic	Calciorthidic Paleustolls	Mollisols.
Valentine [1]	Mixed, mesic	Typic Ustipsamments	Entisols.
Vingo	Coarse-loamy, mixed, mesic	Aridic Paleustalfs	Alfisols.

[1] These soils are taxadjuncts to the Valentine series in that they are calcareous below a depth of 2 feet. This difference does not alter their use, management, or behavior.

TABLE 8.—*Temperature and*

[Data from Dalhart, Texas; elevation 3,989 feet. Period

Month	Temperature				Precipitation			
					Probability, in percent, of receiving selected amounts			
	Average daily maximum	Average monthly maximum	Average daily minimum	Average monthly minimum	Average total	0 inches or trace	0.50 inch or more	1.00 inch or more
	°F	°F	°F	°F	*Inches*			
January	50. 1	71. 9	18. 7	−1. 6	0. 38	10	30	10
February	53. 3	74. 1	22. 8	7. 0	. 51	1	30	10
March	59. 6	80. 9	27. 5	10. 4	. 74	5	45	25
April	70. 1	88. 1	38. 1	24. 5	. 89	5	70	45
May	79. 0	89. 4	49. 1	35. 6	2. 69	<1	94	80
June	88. 1	99. 6	59. 2	47. 6	2. 27	<1	89	70
July	91. 5	101. 0	63. 8	56. 9	3. 32	<1	91	80
August	89. 8	99. 5	62. 2	54. 0	2. 19	<1	90	78
September	82. 5	95. 1	53. 8	41. 2	1. 35	3	69	50
October	73. 2	89. 8	41. 6	28. 3	1. 14	5	69	69
November	59. 6	79. 0	28. 2	11. 9	. 35	18	39	19
December	51. 5	71. 6	21. 1	3. 8	. 42	10	38	18
Year					16. 25			

[1] Based on a 14-year period of record.
[2] Less than one-half day.

characterized by mild winters. Temperature and precipitation data for Dallam County are given in table 8.

Precipitation averages 16.25 inches annually. Approximately 85 percent of this falls during the warm season, April through October. Rainfall varies considerably from month to month and from year to year. Since 1949, the wettest year of record is 1960, when 24.55 inches fell. In 1955, the driest year, only 8.37 inches fell. Warm-season rainfall occurs most frequently as the result of thunderstorms. In exceptionally wet years, a large part of the total rainfall may be in the form of downpours that run off rapidly and erode the soil. In an average year, thunderstorms occur on 50 days at Dalhart.

Winds are south to southwesterly most of the year. In winter, northerly winds predominate. The average relative humidity at noon is estimated at 45 percent in January, 35 percent in April, 42 percent in July, and 37 percent in October. The average percentage of total possible sunshine received is estimated at 69 percent in winter, 71 percent in spring, 77 percent in summer, and 74 percent in fall. In an average year, free-water evaporation exceeds precipitation by 44 inches.

In winter Dallam County is subjected to sharp drops in temperature when cold, polar Canadian air masses sweep southward across the level plains. Sometimes these changes in air mass are accompanied by strong, northerly winds. In spite of occasional low temperatures, the winters in this area are actually mild compared to those of the northern Great Plains. Cold spells rarely last longer than 48 hours before sunshine and southwesterly winds bring rapid warming. Nights are usually clear and cold, with freezes almost every night, and most days are sunny and mild. The lowest temperature of record at Dalhart is −21° F, which occurred on January 4, 1959.

Winter is a dry season, since frequent cold air masses (northers) cut off the supply of moisture from the Gulf of Mexico. Winter precipitation is more often in the form of light snow, which piles up in drifts so that the snowmelt is not uniformly distributed. Figures on average snowfall overestimate expected snowfall in any given year, since a few exceptionally heavy snows cause the average to be greater than normal.

Spring offers the greatest variety in weather; warm and cool spells alternate in rapid succession throughout March and April. Trees and shrubs may bloom too early and be nipped by a late freeze. Occasionally strong northwesterly to southwesterly winds, late in winter and in spring, may cause blowing dust. Thunderstorms, which rarely occur in winter, are frequent late in spring.

Summer is one of the most pleasant seasons at Dalhart. Afternoon temperatures are sometimes hot, but most nights are pleasantly cool. Thundershowers are frequent, and cloudiness and precipitation, when present during the day, cause significant cooling. Evaporative-type air conditioners operate efficiently in this relatively dry climate. The highest temperature of record at Dalhart is 107° F, and this occurred on June 28, 1968.

Fall, like summer, is a pleasant season at Dalhart. Temperatures are moderate, and there is a greater variety in the weather than in summer. Rainfall increases. Mild, sunny days and clear, cool nights characterize the fall season. Winds are not so strong as in spring.

The warm season (freeze-free period) at Dalhart averages 178 days. The average dates of the last occurrence of 32° F or below in the spring and the first occurrence in the fall are April 23 and October 18, respectively.

precipitation data

of record, 1949–69. The symbol < means "less than."]

Precipitation—Continued										
Probability, in percent, of receiving selected amounts—Continued					Average [1] number of days in which precipitation will equal or exceed			Snow, sleet		
2.00 inches or more	3.00 inches or more	4.00 inches or more	5.00 inches or more	6.00 inches or more	0.10 inch	0.50 inch	1.00 inch	Average total	Maximum	Greatest depth [1]
								Inches	*Inches*	*Inches*
5	<1	<1	<1	<1	1	(2)	0	2.7	8.8	7
1	<1	<1	<1	<1	1	(2)	(2)	3.0	16.9	12
8	3	<1	<1	<1	2	(2)	(2)	2.7	12.3	7
23	7	3	<1	<1	2	(2)	(2)	.7	5.0	1
58	39	20	10	5	5	2	1	(3)	(3)	0
40	25	18	8	4	5	2	1	0	0	0
50	29	20	10	6	6	2	1	0	0	0
48	28	15	9	5	5	2	1	0	0	0
29	18	9	4	3	3	1	(2)	0	0	0
25	15	8	4	3	2	1	(2)	(3)	(3)	0
4	1	<1	<1	<1	1	(2)	0	1.4	10.0	8
4	<1	<1	<1	<1	2	(2)	0	2.9	8.1	7
					35	10	4	13.4	16.9	12

[3] Trace, an amount too small to measure.

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Glossary

Alkaline soil. Any soil that is alkaline throughout most or all of the root zone; any soil horizon having a pH value greater than 7.3. (See also Reaction)

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Buried soil. A developed soil that was once exposed but is now overlain by a more recently formed soil.

Calcareous soil. A soil that contains enough calcium carbonate to effervesce (fizz) when treated with dilute hydrochloric acid.

Caliche. A more or less cemented deposit of calcium carbonate in many soils of warm-temperate areas, as in the Southwestern States. The material may consist of soft, thin layers in the soil or of hard, thick beds just beneath the solum, or it may be exposed at the surface by erosion.

Chlorosis. A yellowing between veins on upper foliage that results from chlorophyll deficiency. Many factors, including heredity, cause chlorosis.

Clay. A soil separate, the mineral soil particles less than 0.002 millimeters in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of clay on the surface of a soil aggregate. Synonyms: clay coat, clay skin.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrations of compounds, or of soil grains cemented together. The composition of some concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are examples of material commonly found in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent; does not hold together in a mass when dry or moist.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard and brittle; little affected by moistening.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Fine-textured soils. Sandy clay, silty clay, and clay. Roughly, soil that contains 35 percent or more clay.

Gravel. As a soil separate, the rounded or angular fragments of rock that range in size from 2 millimeters to 3 inches in diameter. As a soil textural class, soil material that consists of 15 to 50 percent gravel, by volume. In engineering, gravel is a coarse-grained soil of which more than 50 percent is retained on a No. 4 screen.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes. The major horizons are:

O horizon.—The layer of organic matter on the surface of a mineral soil. This layer consists of decaying plant residues.

A horizon.—The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active and therefore is marked by the accumulation of humus. The horizon may have lost one or more of soluble salts, clay, and sesquioxides (iron and aluminum oxides).

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has (1) distinctive characteristics caused by accumulation of clay, sesquioxides, humus, or some combination of these (2) by prismatic or blocky structure (3) by redder or stronger colors than the A horizon; or (4) by some combination of the characteristics mentioned in 1, 2, and 3. The combined A and B horizons are usually called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The weathered rock material immediately beneath the solum. In most soils, this material is presumed to be like that from which the overlying horizons were formed. If the material is known to be different from that in the solum, a Roman numeral precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock usually underlies a C horizon, but may be immediately beneath an A or B horizon.

Loam. The textural class name for a soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand.

Loess. A fine-grained eolian deposit consisting dominantly of silt-sized particles.

Medium-textured soil. Soil of very fine sandy loam, loam, silt loam, or silt texture.

Mohs' scale. A scale of hardness introduced by F. Mohs and expressed in terms as follows: (1) talc; (2) gypsum; (3) calcite; (4) fluorite; (5) apatite; (6) orthoclase; (7) quartz; (8) topaz; (9) sapphire; and (10) diamond.

Munsell notation. A system for designating color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with a hue of 10YR, a value of 6, and a chroma of 4.

Organic matter. A general term for plant and animal material, in or on the soil, in all stages of decomposition. Readily decomposed organic matter is often distinguished from the more stable forms that are past the stage of rapid decomposition.

Outwash material. A mantle of soil material, a few feet to 60 or more feet thick, washed from the High Plains and Rocky Mountains by streams of meltwater and deposited on the Permian red beds during the glacial period (Pleistocene epoch).

Parent material. The disintegrated and partly weathered rock from which a soil has formed.

Ped. An individual natural soil aggregate, such as a crumb, or prism, or a block, in contrast to a clod.

Permeability. The quality of a soil horizon that enables water or air to move through it. Terms used to describe permeability are as follows: *very slow, slow, moderately slow, moderate, moderately rapid, rapid,* and *very rapid.*

Phase, soil. A subdivision of a soil, series, or other unit in the soil classification system, made because of differences in the soil, that affect its management but do not affect its classification in the natural landscape. A soil type, for example, may be divided into phases because of differences in slope, stoniness, thickness,

or some other characteristic that affects its management but not its behavior in the natural landscape.

Playa. A flat-bottomed, undrained basin or lakebed that contains water for varying periods following rains. Some playas are dry for long periods and are farmed.

Plowpan. A compacted layer formed in the soil immediately below the plowed layer.

Pores, soil. Open channels in the soil material caused by roots and forms of animal life, such as earthworms and insects. Following are the terms used to define soil pores: Amount: few, less than 5 per square inch; common, 5 to 25 per square inch; many, more than 25 per square inch. The pore size measurements and equivalent rating terms are: very fine, less than 0.25 to 1 millimeter in diameter; medium, 1 to 3 millimeters in diameter; and coarse, 3 millimeters and larger.

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid or alkaline. An acid, or "sour," soil is one that gives an acid reaction; an alkaline soil is one that is alkaline, or basic, in reaction. In words, the degrees of acidity or alkalinity are expressed thus:

	pH		*pH*
Extremely acid	Below 4.5	Mildly alkaline	7.4 to 7.8
Very strongly acid	4.5 to 5.0	Moderately alkaline	7.9 to 8.4
Strongly acid	5.1 to 5.5	Strongly alkaline	8.5 to 9.0
Medium acid	5.6 to 6.0	Very strongly alkaline	9.1 and higher
Slightly acid	6.1 to 6.5		
Neutral	6.6 to 7.3		

Relief. The elevations or inequalities of a land surface, considered collectively.

Sand. Individual rock or mineral fragments in soils having diameters ranging from 0.05 to 2.0 millimeters. Most sand grains consist of quartz, but they may be of any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

Series, soil. A group of soils developed from a particular type of parent material and having genetic horizons that, except for texture of the surface layer, are similar in differentiating characteristics and in arrangement in the profile.

Silt. Individual mineral particles in a soil that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). Soil of the silt textural class is 80 percent or more silt and less than 12 percent clay.

Soil. A natural, three-dimensional body on the earth's surface that supports plants and that has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil-improving crop. A legume or fertilized, nonleguminous crop that is grown for the purpose of improving the soil.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering together without any regular cleavage as in many claypans and hardpans).

Stubble mulching. Maintaining a protective cover by leaving crop residues as a mulch on the surface of the soil after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop. This protects the soil from hot sun, packing rains, soil blowing, and water erosion.

Subsoil. Technically, the B horizon; roughly, the part of the profile below plow depth.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportions of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Topsoil. A presumed fertile soil or soil material, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Well-graded soil. A soil or soil material consisting of particles that are well distributed over a wide range in size or diameter. Such a soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

GUIDE TO MAPPING UNITS

For a full description of a mapping unit, read both the description of the mapping unit and that of the soil series to which the mapping unit belongs. Absence of entry indicates that the soil is not assigned to an irrigated capability unit. Capability units are described on pages 23 and 24, and range sites are described on pages 26 and 27. Other information is given in tables as follows:

Approximate acreage and proportionate extent of the soils, table 1, page 7.
Predicted yields, table 2, page 25.
Interpretations of the soils for wildlife, table 3, page 30.
Engineering uses of the soils, tables 4 and 5, page 32 through page 39.
Use of the soils for recreation, table 6, page 41.

Map symbol	Mapping unit	Page	Capability unit Dryland Symbol	Capability unit Irrigated Symbol	Range site Name
BeC	Berthoud loam, 3 to 5 percent slopes	6	IVe-1	IVe-1	Hardland Slopes
BeD	Berthoud loam, 5 to 8 percent slopes	6	VIe-2	-----	Hardland Slopes
Ch	Church soils	8	IVe-4	IIIe-6	High Lime
CoB	Conlen loam, 0 to 3 percent slopes	9	IVe-1	IIIe-5	Hardland Slopes
CoC	Conlen loam, 3 to 5 percent slopes	9	IVe-1	IVe-1	Hardland Slopes
Cr	Corlena soils	9	Vw-1	-----	Sandy Bottomland
DaB	Dallam loamy fine sand, 0 to 3 percent slopes	11	IVe-2	IIIe-2	Sandyland
DlA	Dallam fine sandy loam, 0 to 1 percent slopes	10	IIIe-1	IIe-1	Sandy Loam
DlB	Dallam fine sandy loam, 1 to 3 percent slopes	10	IIIe-1	IIIe-1	Sandy Loam
Df	Dalupe fine sandy loam	12	IIIe-2	IIe-3	Bottomland
DuA	Dumas loam, 0 to 1 percent slopes	12	IIIe-3	IIe-2	Deep Hardland
DuB	Dumas loam, 1 to 3 percent slopes	12	IIIe-3	IIIe-4	Deep Hardland
GrA	Gruver loam, 0 to 1 percent slopes	13	IIIe-3	IIe-2	Deep Hardland
GrB	Gruver loam, 1 3 percent slopes	13	IIIe-3	IIIe-4	Deep Hardland
Hu	Humbarger loam	14	IIe-1	IIe-3	Bottomland
Kp	Kerrick-Plack association, nearly level	14	-----	-----	----------
	Kerrick part	--	IVe-5	IVe-4	Hardland Slopes
	Plack part	--	VIIs-1	-----	Very Shallow
Ne	Ness clay	15	VIw-1	-----	1/
PcB	Perico loamy fine sand, 0 to 3 percent slopes	16	IVe-2	IIIe-2	Sandyland
PeA	Perico fine sandy loam, 0 to 1 percent slopes	15	IIIe-7	IIIe-3	Mixedland Slopes
PeB	Perico fine sandy loam, 1 to 3 percent slopes	15	IIIe-7	IIIe-3	Mixedland Slopes
PeC	Perico fine sandy loam, 3 to 5 percent slopes	15	IVe-3	IVe-2	Mixedland Slopes
PlB	Plack loam, 0 to 3 percent slopes	16	VIIs-1	-----	Very Shallow
RcB	Rickmore loamy fine sand, 0 to 3 percent slopes	17	IVe-2	IIIe-2	Sandyland
RkA	Rickmore fine sandy loam, 0 to 1 percent slopes	17	IIIe-4	IIe-4	Sandy Loam
Sh	Sherm clay loam	18	IIIe-5	IIs-1	Deep Hardland
SpB	Spurlock fine sandy loam, 0 to 3 percent slopes	18	IIIe-7	IIIe-3	Mixedland Slopes
SpC	Spurlock fine sandy loam, 3 to 5 percent slopes	18	IVe-3	IVe-2	Mixedland Slopes
SrB	Spurlock soils, hummocky	19	VIe-3	-----	Mixedland Slopes
SuA	Sunray loam, 0 to 1 percent slopes	20	IIIe-6	IIe-5	Hardland Slopes
SuB	Sunray loam, 1 to 3 percent slopes	20	IIIe-6	IIIe-5	Hardland Slopes
TeA	Texline loam, 0 to 1 percent slopes	20	IIIe-6	IIe-5	Deep Hardland
Va	Valentine fine sand	21	VIIe-1	-----	Deep Sand
VkE	Valentine-Spurlock complex, 5 to 15 percent slopes	21	VIIe-2	-----	Deep Sand
VlC	Vingo and Dallam soils, undulating	22	VIe-1	IVe-3	Sandyland

1/ Included with surrounding range sites.

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If you are deaf, are hard of hearing, or have speech disabilities and you wish to file either an EEO or program complaint, please contact USDA through the Federal Relay Service at (800) 877-8339 or (800) 845-6136 (in Spanish).

If you have other disabilities and wish to file a program complaint, please see the contact information above. If you require alternative means of communication for

program information (e.g., Braille, large print, audiotape, etc.), please contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

Supplemental Nutrition Assistance Program

For additional information dealing with Supplemental Nutrition Assistance Program (SNAP) issues, call either the USDA SNAP Hotline Number at (800) 221-5689, which is also in Spanish, or the State Information/Hotline Numbers (http://directives.sc.egov.usda.gov/33085.wba).

All Other Inquiries

For information not pertaining to civil rights, please refer to the listing of the USDA Agencies and Offices (http://directives.sc.egov.usda.gov/33086.wba).

OKLAHOMA

N

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
FOREST SERVICE

TEXAS AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP

DALLAM COUNTY, TEXAS

Scale 1:253,440

1 0 1 2 3 4 Miles

SOIL ASSOCIATIONS *

1 — Dallam-Perico association: Deep, noncalcareous and calcareous, loamy soils

2 — Dallam-Vingo-Spurlock association: Deep, noncalcareous and calcareous, sandy and loamy soils

3 — Sunray-Conlen association: Deep, calcareous, loamy soils

4 — Gruver-Sherm-Dumas association: Deep, noncalcareous, loamy soils

5 — Plack-Berthoud association: Very shallow to deep, calcareous, loamy soils

* Texture refers to that of the surface layer of the major soils in each association.

Compiled 1972

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

INDEX TO MAP SHEETS
DALLAM COUNTY, TEXAS

Scale 1:253,440
1 0 1 2 3 4 Miles

N

OKLAHOMA

103°00′ 102°50′ 102°40′ 102°30′ 102°20′ 102°10′ 36°30′ 36°20′ 36°10′

CIMARRON COUNTY

NEW MEXICO

UNION COUNTY

HARTLEY COUNTY

MOORE COUNTY

SHERMAN COUNTY

Kerrick
Texline
Perico
Ware
Bolin
Chamberlin
DALHART
Conlen

Blanca Creek
West Rita Blanca Creek
Rita Blanca Creek
Coldwater Creek
Carrizo Creek
Rita Blanca Creek
Palo Duro Cr.

ATSF
FORT WORTH AND DENVER
CHICAGO ROCK ISLAND AND PACIFIC

1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17 18
19 20 21 22 23 24 25 26 27
28 29 30 31 32 33 34 35 36
37 38 39 40 41 42 43 44 45
46 47 48 49 50 51 52 53 54
55 56 57 58 59 60 61 62 63
64 65 66 67 68 69 70 71 72
73 74 75 76 77

Inset, sheet 73
Inset, sheet 74
Inset, sheet 75
Inset, sheet 76

SOIL LEGEND

The first capital letter is the initial one of the soil name. A second capital letter, A, B, C, D, or E, shows the slope. Most symbols without a slope letter are those of nearly level soils, but some are for soils that have a considerable range of slope. (W) indicates that there are signs of erosion, especially local shifting of soil by wind in some places, but the amount of erosion cannot be estimated reliably.

SYMBOL	NAME
BeC	Berthoud loam, 3 to 5 percent slopes
BeD	Berthoud loam, 5 to 8 percent slopes
Ch	Church soils
CoB	Conlen loam, 0 to 3 percent slopes
CoC	Conlen loam, 3 to 5 percent slopes
Cr	Corlena soils
DaB	Dallam loamy fine sand, 0 to 3 percent slopes (W)
DlA	Dallam fine sandy loam, 0 to 1 percent slopes
DlB	Dallam fine sandy loam, 1 to 3 percent slopes
Df	Dalupe fine sandy loam
DuA	Dumas loam, 0 to 1 percent slopes
DuB	Dumas loam, 1 to 3 percent slopes
GrA	Gruver loam, 0 to 1 percent slopes
GrB	Gruver loam, 1 to 3 percent slopes
Hu	Humbarger loam
Kp	Kerrick-Plack association, nearly level (1)
Ne	Ness clay
PcB	Perico loamy fine sand, 0 to 3 percent slopes (W)
PeA	Perico fine sandy loam, 0 to 1 percent slopes
PeB	Perico fine sandy loam, 1 to 3 percent slopes
PeC	Perico fine sandy loam, 3 to 5 percent slopes
PlB	Plack loam, 0 to 3 percent slopes
RcB	Rickmore loamy fine sand, 0 to 3 percent slopes (W)
RkA	Rickmore fine sandy loam, 0 to 1 percent slopes
Sh	Sherm clay loam
SpB	Spurlock fine sandy loam, 0 to 3 percent slopes
SpC	Spurlock fine sandy loam, 3 to 5 percent slopes
SrB	Spurlock soils, hummocky (W)
SuA	Sunray loam, 0 to 1 percent slopes
SuB	Sunray loam, 1 to 3 percent slopes
TeA	Texline loam, 0 to 1 percent slopes
Va	Valentine fine sand
VkE	Valentine-Spurlock complex, 5 to 15 percent slopes (W)
VlC	Vingo and Dallam soils, undulating (1) (W)

(1) The delineations are much larger and the composition of these units is more variable than other map units in the county. Mapping has been controlled well enough, however, for the anticipated use of the soils.

CONVENTIONAL SIGNS

WORKS AND STRUCTURES

Highways and roads
- Divided
- Good motor
- Poor motor
- Trail

Highway markers
- National Interstate
- U. S.
- State or county

Railroads
- Single track
- Multiple track
- Abandoned

Bridges and crossings
- Road
- Trail
- Railroad
- Ferry (FY)
- Ford (FORD)
- Grade
- R. R. over
- R. R. under

Buildings
- School
- Church

Mine and quarry

Gravel pit

Power line

Pipeline

Cemetery

Dams

Levee

Tanks

Well, oil or gas

Forest fire or lookout station

Windmill

Located object

BOUNDARIES

- National or state
- County
- Minor civil division
- Reservation
- Land grant
- Small park, cemetery, airport
- Land survey division corners

DRAINAGE

Streams, double-line
- Perennial
- Intermittent

Streams, single-line
- Perennial
- Intermittent
  - Crossable with tillage implements
  - Not crossable with tillage implements
  - Unclassified

Canals and ditches

Lakes and ponds
- Perennial (water, w)
- Intermittent (int)

Well, irrigation

Marsh or swamp

Wet spot

Drainage end or alluvial fan

RELIEF

Escarpments
- Bedrock
- Other

Short steep slope

Prominent peak

Depressions

	Large	Small
Crossable with tillage implements		
Not crossable with tillage implements		
Contains water most of the time		

SOIL SURVEY DATA

- Soil boundary and symbol (Dx)
- Gravel
- Stoniness
  - Stony
  - Very stony
- Rock outcrops
- Chert fragments
- Clay spot
- Sand spot
- Gumbo or scabby spot
- Made land
- Severely eroded spot
- Blowout, wind erosion
- Gully
- Caliche pit (C.P.)

DALLAM COUNTY, TEXAS — SHEET NUMBER 1

DALLAM COUNTY, TEXAS NO. 1

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.
Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.
Land division corners are approximately positioned on this map.

1 550 000 FEET

UNION COUNTY NEW MEXICO

CIMARRON COUNTY OKLAHOMA

910 000 FEET

NEW MEXICO

UNION COUNTY

1 570 000 FEET

900 000 FEET

(Joins sheet 2)

(Joins sheet 10)

N

2 Miles

10 000 Feet

5 000

Scale 1:24 000

DALLAM COUNTY, TEXAS — SHEET NUMBER 2

Scale 1:24 000

1 Mile | 2 Miles
5 000 Feet | 10 000 Feet
1 | 5 000
¾ | 4 000
½ | 3 000
¼ | 2 000
0 | 1 000
0

Land division corners are approximately positioned on this map.

Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.

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DALLAM COUNTY, TEXAS NO. 2

DALLAM COUNTY, TEXAS — SHEET NUMBER 3

DALLAM COUNTY, TEXAS NO. 3

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Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.
Land division corners are approximately positioned on this map.

1 610 000 FEET

CIMARRON COUNTY, OKLAHOMA

910 000 FEET

900 000 FEET

1 630 000 FEET

(Joins sheet 2)

(Joins sheet 4)

(Joins sheet 12)

Buffalo Springs

Coldwater Creek

298

3

N

Scale 1:24 000

2 Miles

10 000 Feet

5 000

4

DALLAM COUNTY, TEXAS — SHEET NUMBER 4

N

CIMARRON COUNTY, OKLAHOMA

1 660 000 FEET

910 000 FEET

900 000 FEET

1 640 000 FEET

Scale 1:24 000

2 Miles

10 000 Feet

5 000

0 0 1 000 2 000 3 000 4 000 5 000

1/4 1/2 3/4 1

Land division corners are approximately positioned on this map.

Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.

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DALLAM COUNTY, TEXAS NO. 4

DALLAM COUNTY, TEXAS — SHEET NUMBER 5

5

N

CIMARRON COUNTY OKLAHOMA

1 670 000 FEET

910 000 FEET

900 000 FEET

1 690 000 FEET

(Joins sheet 4)

(Joins sheet 6)

(Joins sheet 14)

2 Miles

10 000 Feet

5 000

Scale 1:24 000

0 0

¼ 1 000

½ 2 000

¾ 3 000

1 4 000

5 000

DALLAM COUNTY, TEXAS NO. 5

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Land division corners are approximately positioned on this map.

DALLAM COUNTY, TEXAS — SHEET NUMBER 6

CIMARRON COUNTY | OKLAHOMA

1 720 000 FEET

910 000 FEET

900 000 FEET

1 700 000 FEET

(Joins sheet 5)

(Joins sheet 7)

(Joins sheet 15)

N

Scale 1:24 000

2 Miles

10 000 Feet

1 5 000 0 1/4 1 000 1/2 2 000 3/4 3 000 1 4 000 5 000

Land division corners are approximately positioned on this map.

Photobase from 1971 aerial photography. Positions of 10-000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.

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DALLAM COUNTY, TEXAS

DALLAM COUNTY, TEXAS NO. 7

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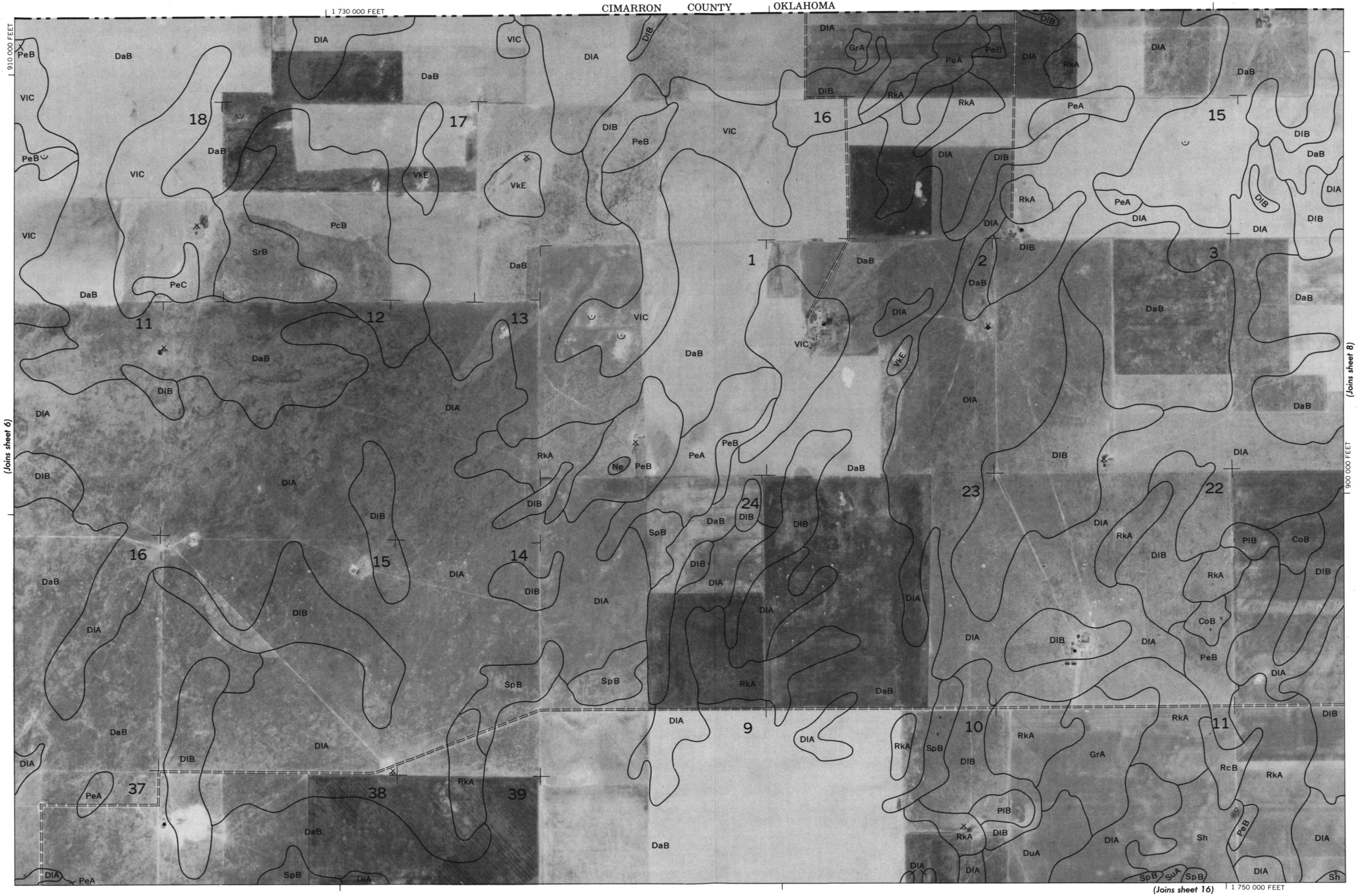
Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.
Land division corners are approximately positioned on this map.

1 730 000 FEET

CIMARRON COUNTY OKLAHOMA

910 000 FEET



(Joins sheet 6)

(Joins sheet 8)

900 000 FEET

(Joins sheet 16)

1 750 000 FEET

N

2 Miles

10 000 Feet

Scale 1:24 000

1 0 1 5 000

¼ 0 1 000

½ 2 000 3 000

¾ 4 000 5 000

CIMARRON COUNTY OKLAHOMA

1 780 000 FEET

910 000 FEET

N

2 Miles

10 000 Feet

Scale 1:24 000

1 | 5 000 | 0

1 | 5 000 | 0 | 1 000

¼ | 4 000 | 0 | 2 000

½ | 3 000 | 1 000 | 3 000

¾ | 4 000 | 2 000 | 4 000

1 | 5 000 | 3 000 | 5 000

900 000 FEET

(Joins sheet 7)

(Joins sheet 9)

(Joins sheet 17)

1 760 000 FEET

Kerrick

287

AND

SF

807

Land division corners are approximately positioned on this map.

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DALLAM COUNTY, TEXAS NO. 8

DALLAM COUNTY, TEXAS — SHEET NUMBER 9

DALLAM COUNTY, TEXAS NO. 9

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Land division corners are approximately positioned on this map.

(Joins sheet 8)

CIMARRON COUNTY OKLAHOMA

1 790 000 FEET

910 000 FEET

Kerrick

287

ATCHISON TOPEKA AND SANTA FE

807

C.P.

SHERMAN COUNTY, TEXAS

1 900 000 FEET

1 810 000 FEET

(Joins sheet 18)

9

N

2 Miles

10 000 Feet

5 000

Scale 1:24 000

(10)

DALLAM COUNTY, TEXAS — SHEET NUMBER 10

(Joins sheet 1)

1 570 000 FEET

890 000 FEET

880 000 FEET

1 550 000 FEET

(Joins sheet 11)

(Joins sheet 19)

N

2 Miles

10 000 Feet

Scale 1:24 000

1 5 000 0 1 000 2 000 3 000 4 000 5 000

1/4 1/2 3/4

NEW MEXICO

UNION COUNTY

Land division corners are approximately positioned on this map.

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DALLAM COUNTY, TEXAS NO. 10

DALLAM COUNTY, TEXAS NO. 11

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Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.
Land division corners are approximately positioned on this map.

1 580 000 FEET

890 000 FEET

880 000 FEET

1 600 000 FEET

(Joins sheet 10)

(Joins sheet 2)

(Joins sheet 12)

(Joins sheet 20)

11

N

Scale 1:24 000

2 Miles

10000 Feet

5 000

0

1 000

2 000

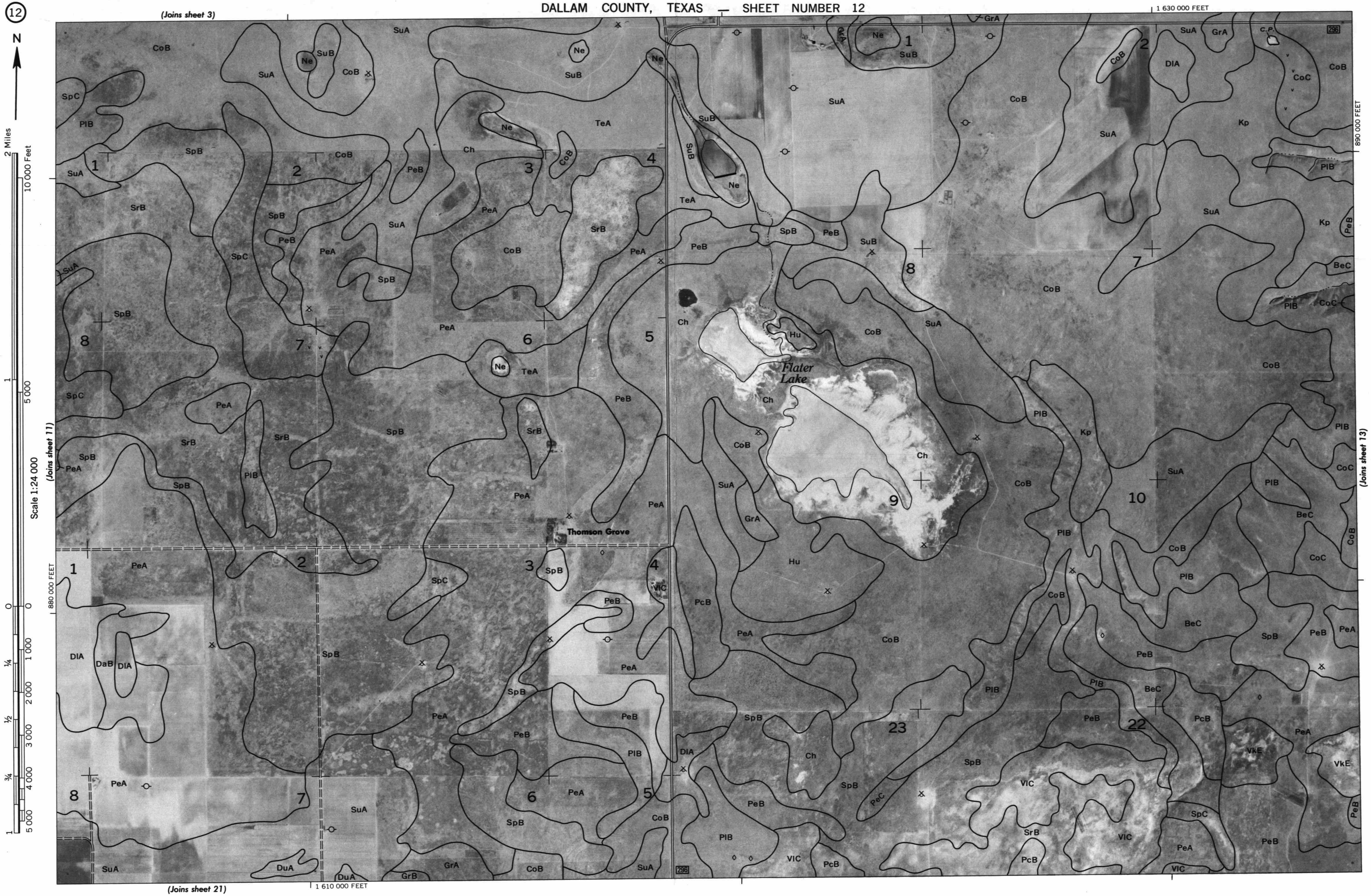
3 000

4 000

5 000

(12)

DALLAM COUNTY, TEXAS — SHEET NUMBER 12



Photobase from 1971 aerial photography. Positions of 10 000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.
Land division corners are approximately positioned on this map.
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DALLAM COUNTY, TEXAS NO. 12

DALLAM COUNTY, TEXAS — SHEET NUMBER 13

13

DALLAM COUNTY, TEXAS NO. 13

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.
Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.
Land division corners are approximately positioned on this map.

1 640 000 FEET

890 000 FEET

(Joins sheet 12)

(Joins sheet 4)

(Joins sheet 14)

(Joins sheet 22)

880 000 FEET

1 660 000 FEET

N

Scale 1:24 000

2 Miles

10 000 Feet

5 000

4 000

DALLAM COUNTY, TEXAS — SHEET NUMBER 14

(14)

N

Scale 1:24 000

2 Miles 1 0 10 000 Feet 5 000 0

¼ 1 000 ½ 2 000 ¾ 3 000 1 4 000 5 000

(Joins sheet 5)

(Joins sheet 13)

(Joins sheet 15)

(Joins sheet 23)

1 690 000 FEET

1 890 000 FEET

880 000 FEET

1 670 000 FEET

Land division corners are approximately positioned on this map.

Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.

DALLAM COUNTY, TEXAS NO. 14

DALLAM COUNTY, TEXAS — SHEET NUMBER 15

DALLAM COUNTY, TEXAS NO. 15

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.
Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.
Land division corners are approximately positioned on this map.

1 700 000 FEET

890 000 FEET

(Joins sheet 6)

(Joins sheet 14)

(Joins sheet 24)

(Joins sheet 16)

880 000 FEET

1 720 000 FEET

15

N

Scale 1:24 000

2 Miles 1 0

10 000 Feet 5 000 0

¼ 0

½ 1 000

¾ 2 000

1 3 000

5 000 4 000

DALLAM COUNTY, TEXAS — SHEET NUMBER 16

(16)

N

Scale 1:24 000

2 Miles 10 000 Feet

1 5 000 0

¼ 1 000 0

½ 2 000 3 000

¾ 4 000 5 000

1 750 000 FEET

890 000 FEET

880 000 FEET

1 730 000 FEET

(Joins sheet 7)

(Joins sheet 15)

(Joins sheet 17)

(Joins sheet 25)

DlA DlB DaB PeA SpB PcB DuA PlB RkA SuA Sh TeA SuB Ne Kp RcB PeB GrA DuB CoB CoC BeC BeD GrB

Coldwater Creek

42 41 40 8 7 6 64 65 115 114 113 11 12 13 116 117 118 16 15 14 102 103 104

Land division corners are approximately positioned on this map.

Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.

DALLAM COUNTY, TEXAS NO. 16

DALLAM COUNTY, TEXAS — SHEET NUMBER 17

DALLAM COUNTY, TEXAS NO. 17

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.
Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.
Land division corners are approximately positioned on this map.

1 760 000 FEET

890 000 FEET

(Joins sheet 8)

(Joins sheet 16)

(Joins sheet 18)

(Joins sheet 26)

1 780 000 FEET

880 000 FEET

17

N

2 Miles

10 000 Feet

Scale 1:24 000

(Joins sheet 9)

(Joins sheet 17)

(Joins sheet 27)

1 810 000 FEET

890 000 FEET

880 000 FEET

1 790 000 FEET

N

Scale 1:24 000

2 Miles 1 0

10 000 Feet 5 000 0

5 000 4 000 3 000 2 000 1 000 0

1 ¾ ½ ¼ 0

807

ATCHISON TOPEKA AND SANTA FE

287

COUNTY

SHERMAN COUNTY

53 54 55 56

86 85 84 83

87 88 89 90

120 119 118 117

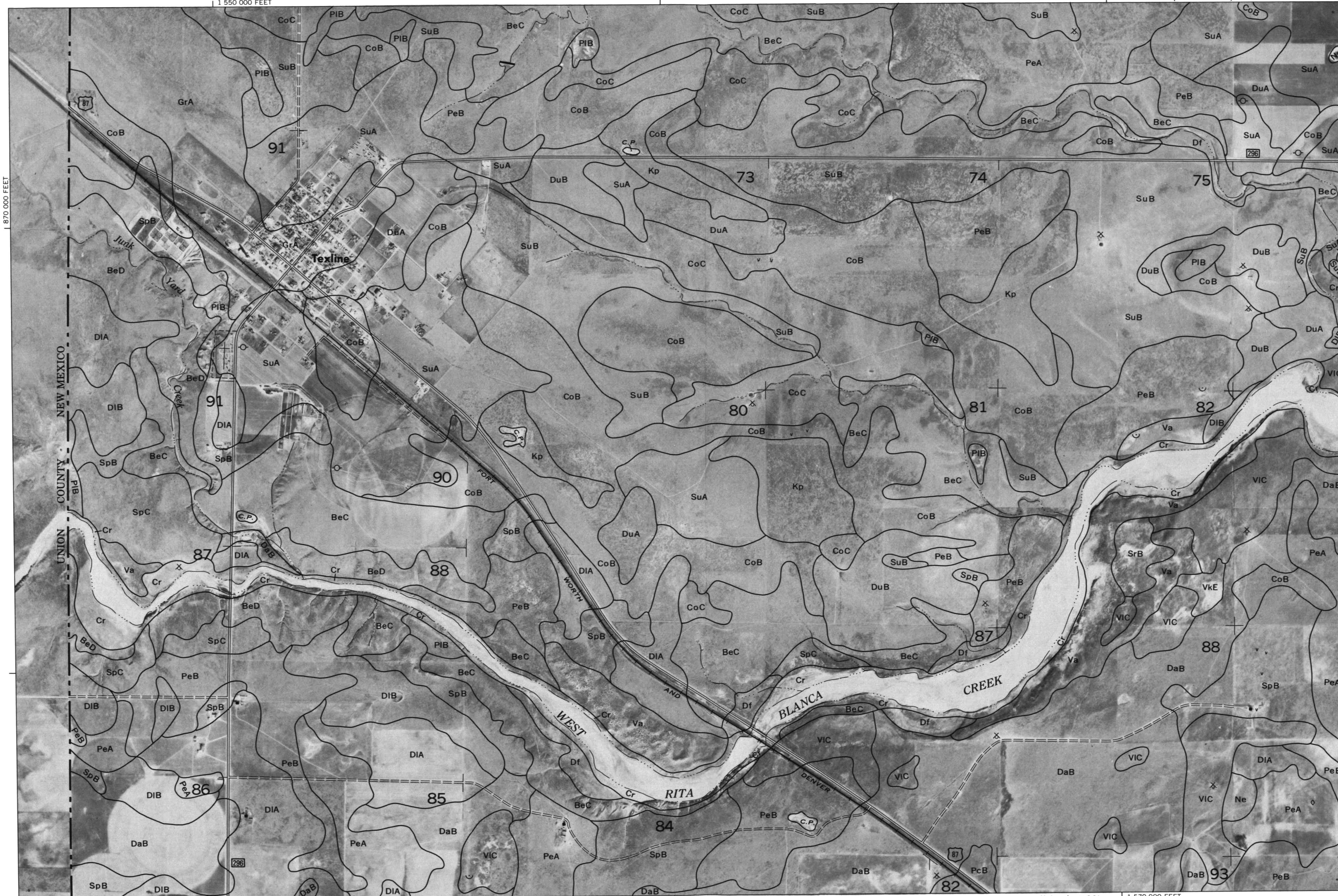
Sh SuA SuB DuB GrA GrB CoB DuA PlB Ne SpB TeA DlA DlB SuA C.P.

Land division corners are approximately positioned on this map.

Photobase from 1971 aerial photography. Positions of 10-000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.

DALLAM COUNTY, TEXAS NO. 18



DALLAM COUNTY, TEXAS NO. 19

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station. Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone. Land division corners are approximately positioned on this map.

(Joins sheet 11)

1 600 000 FEET

870 000 FEET

860 000 FEET

1 580 000 FEET

(Joins sheet 19)

(Joins sheet 21)

(Joins sheet 29)

N

Scale 1:24 000

2 Miles 10 000 Feet

1 5 000 0

¼ 1 000 0

½ 2 000

¾ 3 000

1 4 000

5 000

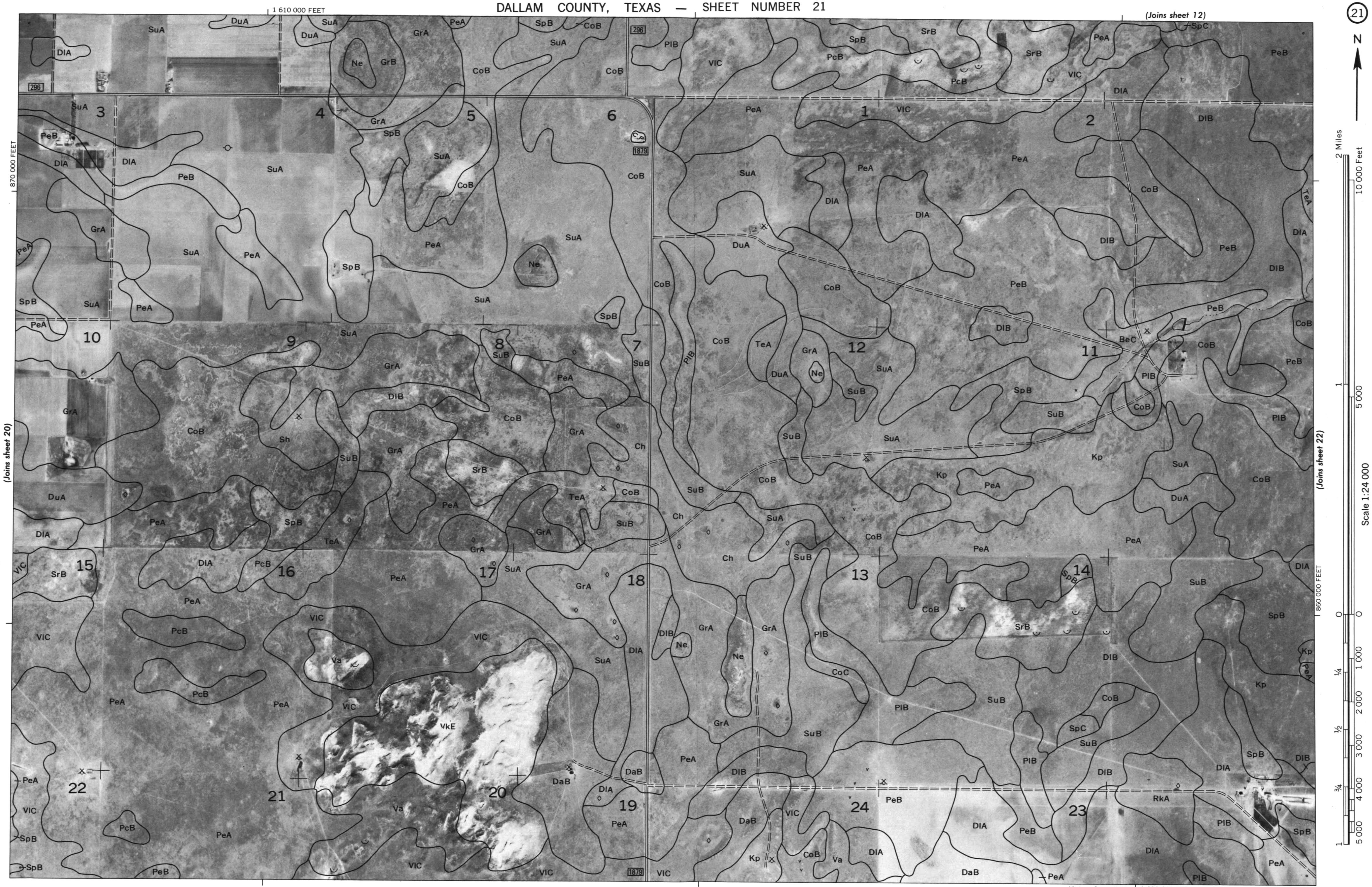
Land division corners are approximately positioned on this map.

Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.

DALLAM COUNTY, TEXAS NO. 20

DALLAM COUNTY, TEXAS — SHEET NUMBER 21



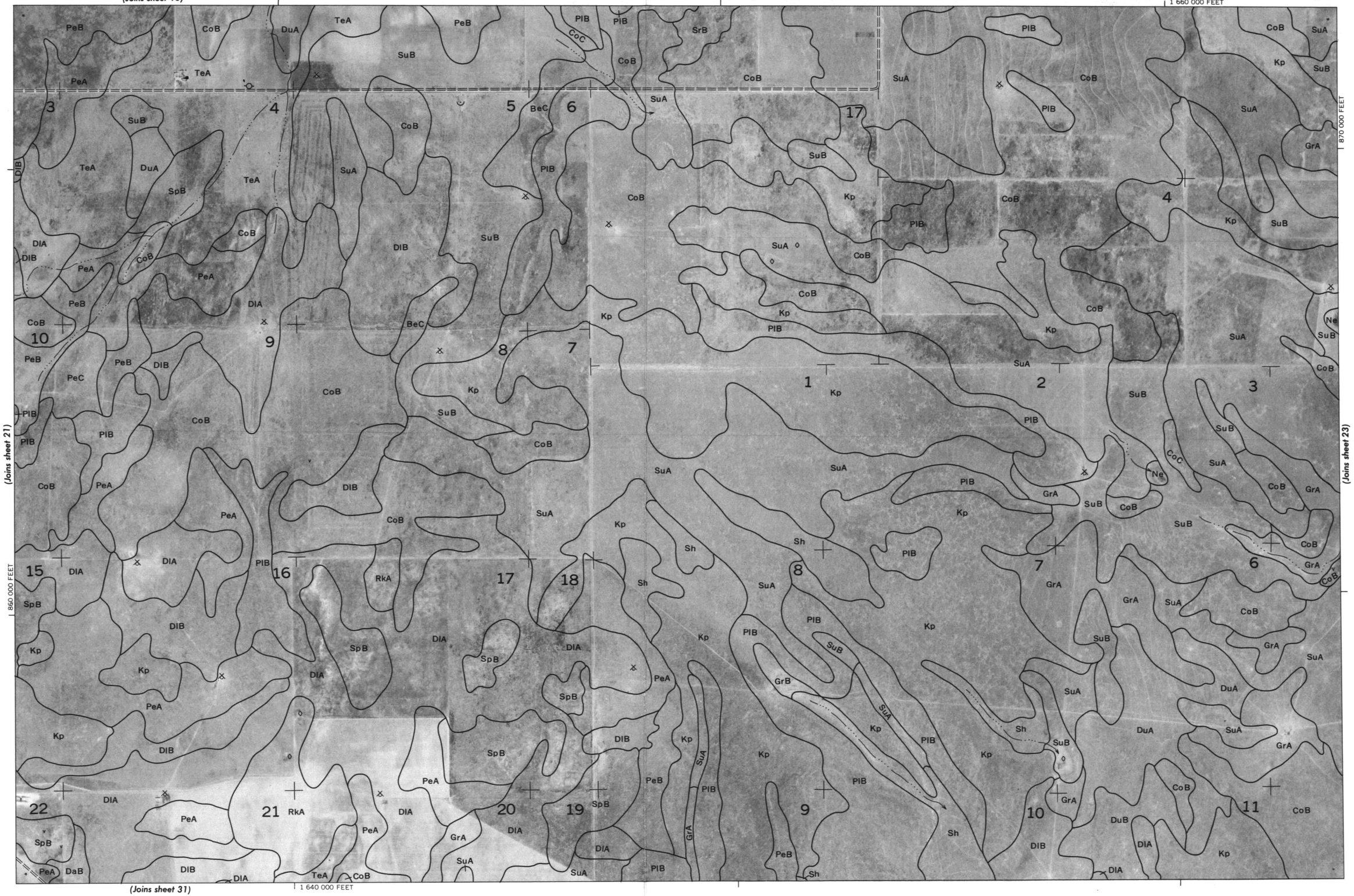
DALLAM COUNTY, TEXAS NO. 21

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.
Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.
Land division corners are approximately positioned on this map.

(Joins sheet 13)

1 660 000 FEET

870 000 FEET



860 000 FEET

(Joins sheet 21)

(Joins sheet 23)

(Joins sheet 31)

1 640 000 FEET

Land division corners are approximately positioned on this map.

Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.

DALLAM COUNTY, TEXAS NO. 22

DALLAM COUNTY, TEXAS — SHEET NUMBER 23

DALLAM COUNTY, TEXAS NO. 23

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.
Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.
Land division corners are approximately positioned on this map.

1 670 000 FEET

870 000 FEET

(Joins sheet 14)

(Joins sheet 22)

(Joins sheet 24)

(Joins sheet 32)

1 690 000 FEET

860 000 FEET

23

N

2 Miles

10 000 Feet

5 000

0

Scale 1:24 000

1 0 1 000 2 000 3 000 4 000 5 000

¼ ½ ¾ 1

(24)

N

Scale 1:24 000

2 Miles 1 0

10 000 Feet 5 000 0

1 ¼ ½ ¾ 1

5 000 4 000 3 000 2 000 1 000 0

(Joins sheet 15)

1 720 000 FEET

870 000 FEET

860 000 FEET

1 700 000 FEET

(Joins sheet 23)

(Joins sheet 25)

(Joins sheet 33)

Land division corners are approximately positioned on this map.

Photobase from 1971 aerial photography. Positions of 10-000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.

DALLAM COUNTY, TEXAS NO. 24

DALLAM COUNTY, TEXAS — SHEET NUMBER 25

DALLAM COUNTY, TEXAS NO. 25

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.
Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.
Land division corners are approximately positioned on this map.

1 730 000 FEET

870 000 FEET

(Joins sheet 16)

(Joins sheet 24)

(Joins sheet 26)

860 000 FEET

(Joins sheet 34)

1 750 000 FEET

N

2 Miles

10 000 Feet

Scale 1:24 000

1 5 000 0 0

¼ 1 000 2 000

½ 3 000 4 000

¾ 5 000

DALLAM COUNTY, TEXAS — SHEET NUMBER 26

(Joins sheet 17)

1 780 000 FEET

870 000 FEET

860 000 FEET

(Joins sheet 25)

(Joins sheet 27)

(Joins sheet 35)

1 760 000 FEET

Scale 1:24 000

2 Miles 10 000 Feet

1 5 000

¼ 1 000 2 000

½ 3 000 4 000

¾ 4 000

1 5 000

0 0

Land division corners are approximately positioned on this map.

Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.

DALLAM COUNTY, TEXAS NO. 26

DALLAM COUNTY, TEXAS — SHEET NUMBER 27

DALLAM COUNTY, TEXAS NO. 27

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.
Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.
Land division corners are approximately positioned on this map.

1 790 000 FEET

870 000 FEET

(Joins sheet 18)

(Joins sheet 26)

(Joins sheet 36)

1 810 000 FEET

860 000 FEET

SHERMAN COUNTY

Coldwater Creek

121 122 123 124 151 152 153 154 155 156 157 158 185 186 187 188

PlB SuA CoB SuB DlA DlB GrA PeB Sh TeA DuA CoC SpC SpB BeC Df Hu PeA

807

27

N

2 Miles 10 000 Feet

Scale 1:24 000

1 5 000 0

¼ 1 000 0

½ 2 000

¾ 3 000

1 4 000

5 000

DALLAM COUNTY, TEXAS — SHEET NUMBER 28

Scale 1:24 000

2 Miles 1 0 1 2 3 4 5 Feet
10 000 5 000 0 1 000 2 000 3 000 4 000 5 000

Land division corners are approximately positioned on this map.

Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.

DALLAM COUNTY, TEXAS NO. 28

DALLAM COUNTY, TEXAS NO. 29

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.
Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.
Land division corners are approximately positioned on this map.

1 580 000 FEET

850 000 FEET

840 000 FEET

1 600 000 FEET

(Joins sheet 28)

(Joins sheet 20)

(Joins sheet 30)

(Joins sheet 38)

29

N

2 Miles

1 10 000 Feet

1 5 000

Scale 1:24 000

0 1 000

¼ 2 000

½ 3 000

¾ 4 000

1 5 000

RITA BLANCA CREEK

FORT WORTH AND DENVER

Corlena

C.P.

78 79 80 81

65 64 63 62 61 20

56 57 58 60 41

PeB PeC PeA DIB DaB SpB RkA VIC VkE Df Cr Va PcB SrB DIA DuA Ne SuA SrB

N

Scale 1:24 000

2 Miles 1 0 10 000 Feet

1 5 000 0 1 000 2 000 3 000 4 000 5 000

¼ ½ ¾ 1

(Joins sheet 21)

(Joins sheet 29)

(Joins sheet 31)

(Joins sheet 39)

1 630 000 FEET

850 000 FEET

840 000 FEET

1 610 000 FEET

Rita Blanca Creek

1879

Land division corners are approximately positioned on this map.

Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.

DALLAM COUNTY, TEXAS NO. 30

DALLAM COUNTY, TEXAS — SHEET NUMBER 31

DALLAM COUNTY, TEXAS NO. 31

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.
Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.
Land division corners are approximately positioned on this map.

1 640 000 FEET

850 000 FEET

(Joins sheet 22)

(Joins sheet 30)

(Joins sheet 32)

(Joins sheet 40)

1 660 000 FEET

840 000 FEET

31

N

2 Miles

10 000 Feet

Scale 1:24 000

1 5 000

¼ 1 000 2 000

½ 3 000

¾ 4 000

1 5 000

(Joins sheet 23)

1 690 000 FEET

850 000 FEET

(Joins sheet 31)

(Joins sheet 33)

840 000 FEET

(Joins sheet 41)

1 670 000 FEET

N

2 Miles

10 000 Feet

Scale 1:24 000

1 5 000 0 1 000 2 000 3 000 4 000 5 000

¼ ½ ¾ 1

Land division corners are approximately positioned on this map.

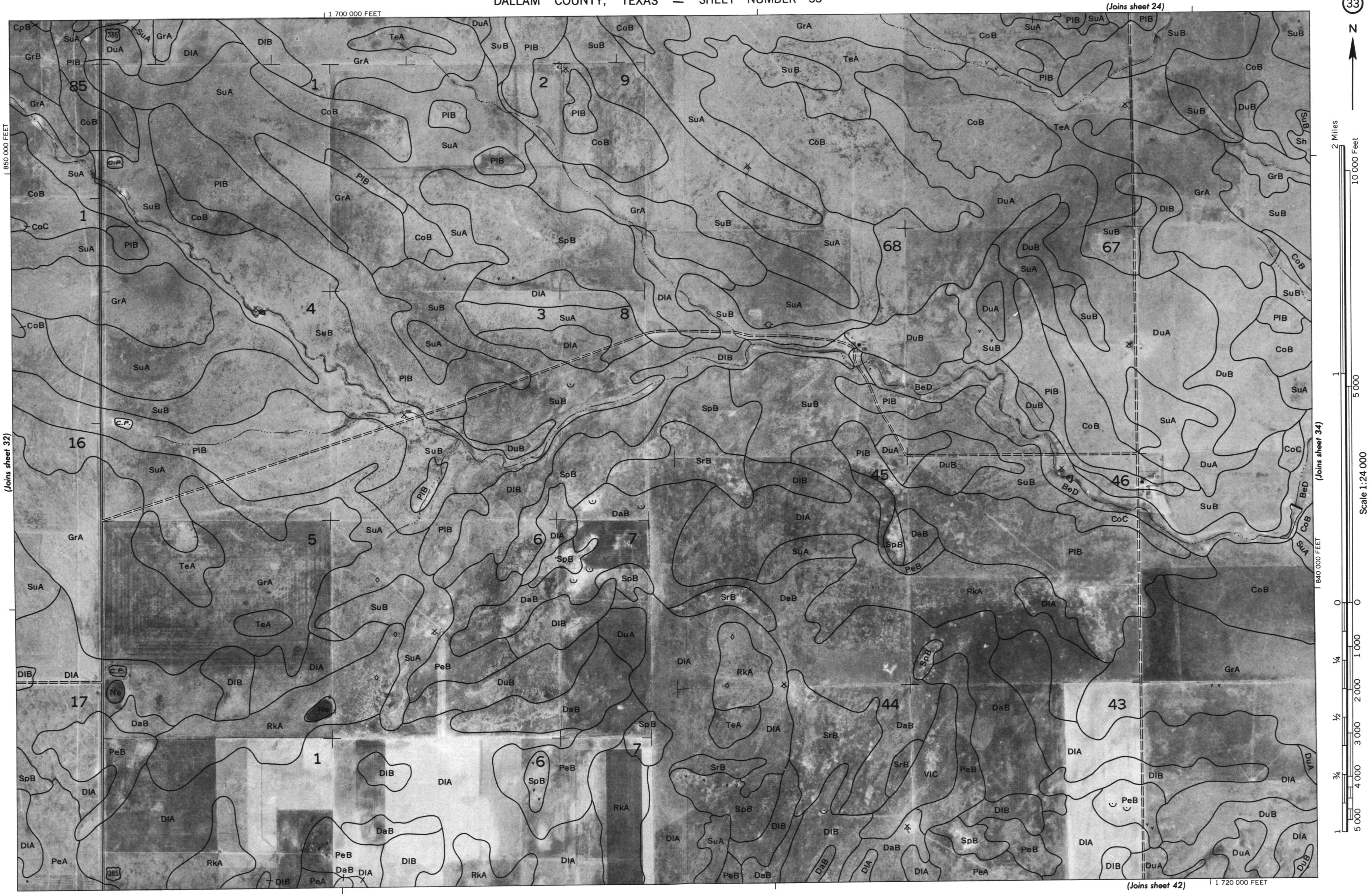
Photobase from 1971 aerial photography. Positions of 10-000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.

DALLAM COUNTY, TEXAS NO. 32

DALLAM COUNTY, TEXAS NO. 33

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.
Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.
Land division corners are approximately positioned on this map.



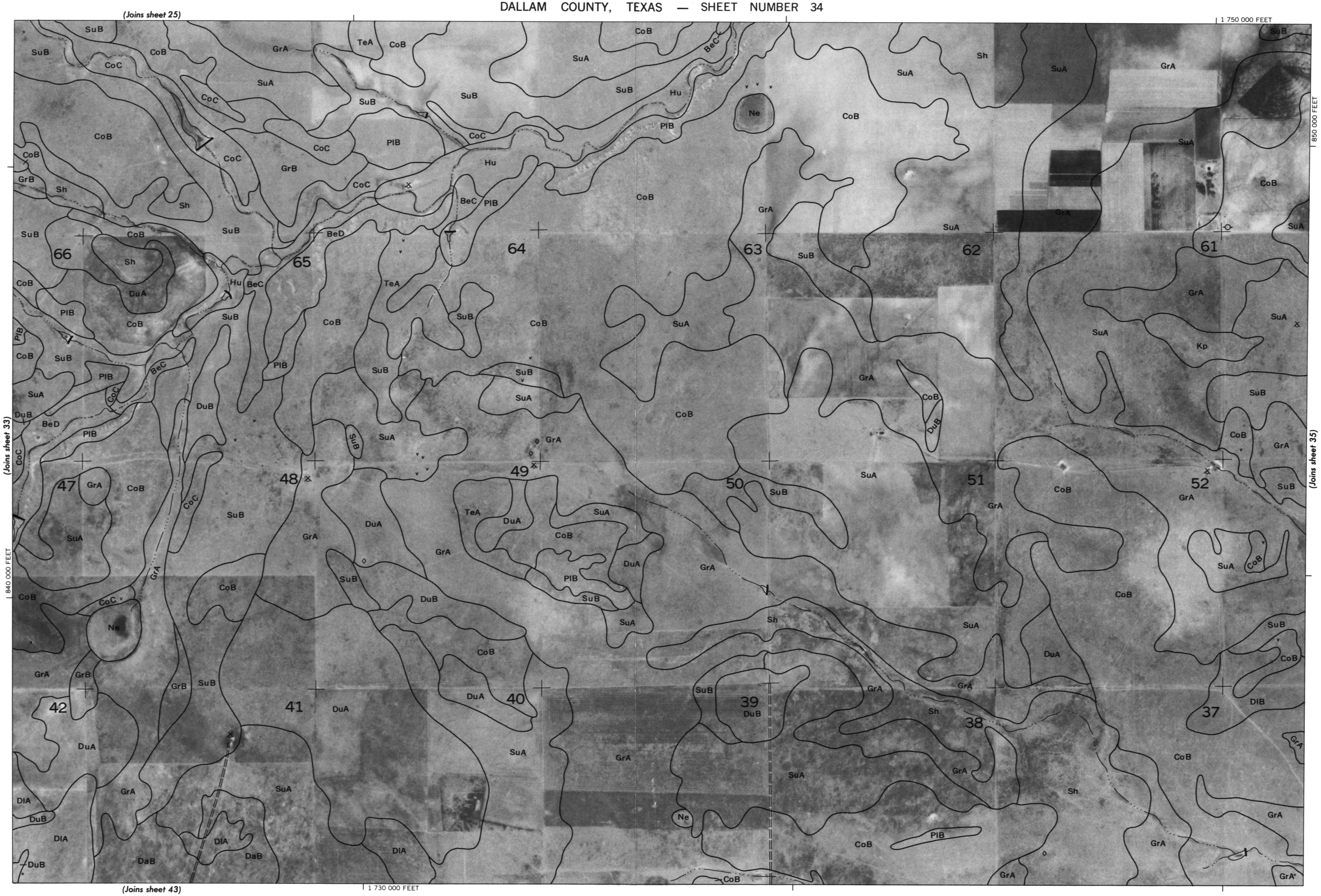
DALLAM COUNTY, TEXAS — SHEET NUMBER 34

N

Scale 1:24 000

2 Miles | 1 | ¾ | ½ | ¼ | 0

10 000 Feet | 5 000 | 0 | 1 000 | 2 000 | 3 000 | 4 000 | 5 000



Land division corners are approximately positioned on this map.
Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.

DALLAM COUNTY, TEXAS — SHEET NUMBER 35

DALLAM COUNTY, TEXAS NO. 35

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.
Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.
Land division corners are approximately positioned on this map.

1 760 000 FEET

850 000 FEET

(Joins sheet 26)

(Joins sheet 34)

(Joins sheet 36)

840 000 FEET

(Joins sheet 44)

1 780 000 FEET

35

N

Scale 1:24 000

2 Miles

10 000 Feet

1 5 000

¼ 1 000 2 000

½ 3 000

¾ 4 000

1 5 000

(Joins sheet 27)

(Joins sheet 35)

(Joins sheet 45)

1 810 000 FEET

850 000 FEET

840 000 FEET

1 790 000 FEET

SHERMAN COUNTY

Spladwater Creek

189 190 191 192

222 221 220 219

223 224 225 226

2 3 28

807

Scale 1:24 000

2 Miles 10 000 Feet

1 5 000 0

¼ 1 000

½ 2 000

¾ 3 000

1 4 000

1 5 000 0

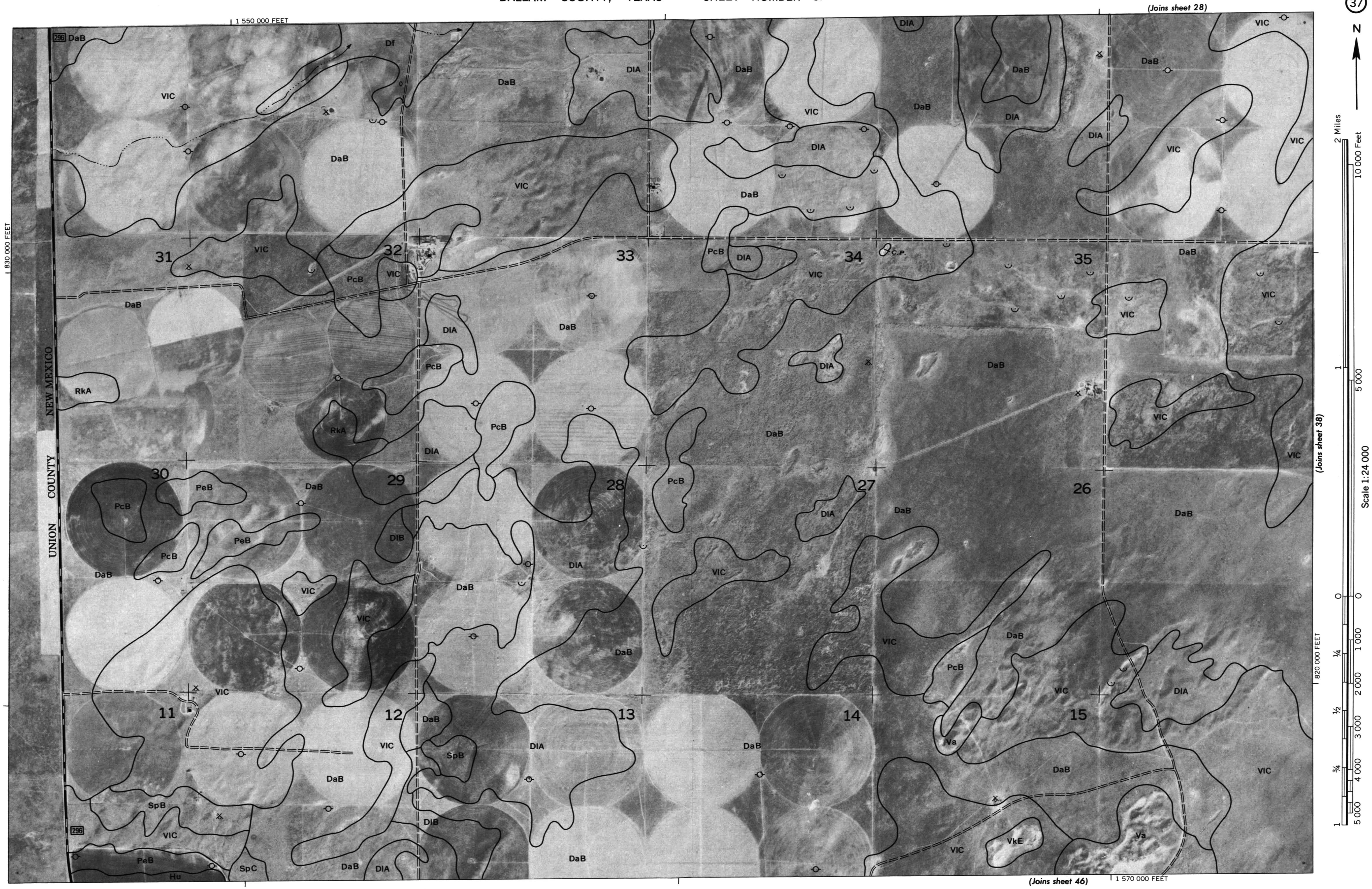
Land division corners are approximately positioned on this map.

Photobase from 1971 aerial photography. Positions of 10-000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.

DALLAM COUNTY, TEXAS NO. 36

DALLAM COUNTY, TEXAS — SHEET NUMBER 37



DALLAM COUNTY, TEXAS NO. 37

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.
Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.
Land division corners are approximately positioned on this map.

DALLAM COUNTY, TEXAS — SHEET NUMBER 38

N

2 Miles

10 000 Feet

Scale 1:24 000

1 5 000 0 0 1 000 2 000 3 000 4 000 5 000

Land division corners are approximately positioned on this map.

Photobase from 1971 aerial photography. Positions of 10-000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.

DALLAM COUNTY, TEXAS NO. 38

DALLAM COUNTY, TEXAS — SHEET NUMBER 39

DALLAM COUNTY, TEXAS NO. 39

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.
Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.
Land division corners are approximately positioned on this map.

(Joins sheet 30)
(Joins sheet 38)
(Joins sheet 40)
(Joins sheet 48)

1 610 000 FEET
830 000 FEET
820 000 FEET
1 630 000 FEET

N

Scale 1:24 000

2 Miles
10 000 Feet
1
5 000
0
1 000
¼
2 000
½
3 000
¾
4 000
1
5 000

Hu Creek
Blanco Creek
FORT WORTH AND DENVER
C.P.
1879
87

(Joins sheet 31)

1 660 000 FEET

N

2 Miles 10 000 Feet

1 5 000

Scale 1:24 000

(Joins sheet 39)

820 000 FEET

(Joins sheet 41)

830 000 FEET

(Joins sheet 49)

1 640 000 FEET

Land division corners are approximately positioned on this map.

Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.

DALLAM COUNTY, TEXAS NO. 40

DALLAM COUNTY, TEXAS NO. 41

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.
Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.
Land division corners are approximately positioned on this map.

1 670 000 FEET

830 000 FEET

(Joins sheet 32)

(Joins sheet 40)

(Joins sheet 42)

820 000 FEET

(Joins sheet 50)

1 690 000 FEET

N

Scale 1:24 000

2 Miles 1 0

10 000 Feet 5 000 0

¼ 1 000

½ 2 000

¾ 3 000

1 4 000

5 000

(Joins sheet 33)

(Joins sheet 41)

(Joins sheet 43)

(Joins sheet 51)

1 720 000 FEET

830 000 FEET

820 000 FEET

1 700 000 FEET

N

Scale 1:24 000

2 Miles 0 1 000 2 000 3 000 4 000 5 000 Feet

1 0 5 000 10 000

Land division corners are approximately positioned on this map.

Photobase from 1971 aerial photography. Positions of 10-000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.

DALLAM COUNTY, TEXAS NO. 42

DALLAM COUNTY, TEXAS — SHEET NUMBER 43

43

N

DALLAM COUNTY, TEXAS NO. 43

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.
Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.
Land division corners are approximately positioned on this map.

1 730 000 FEET

830 000 FEET

(Joins sheet 34)

(Joins sheet 42)

(Joins sheet 44)

820 000 FEET

(Joins sheet 52)

1 750 000 FEET

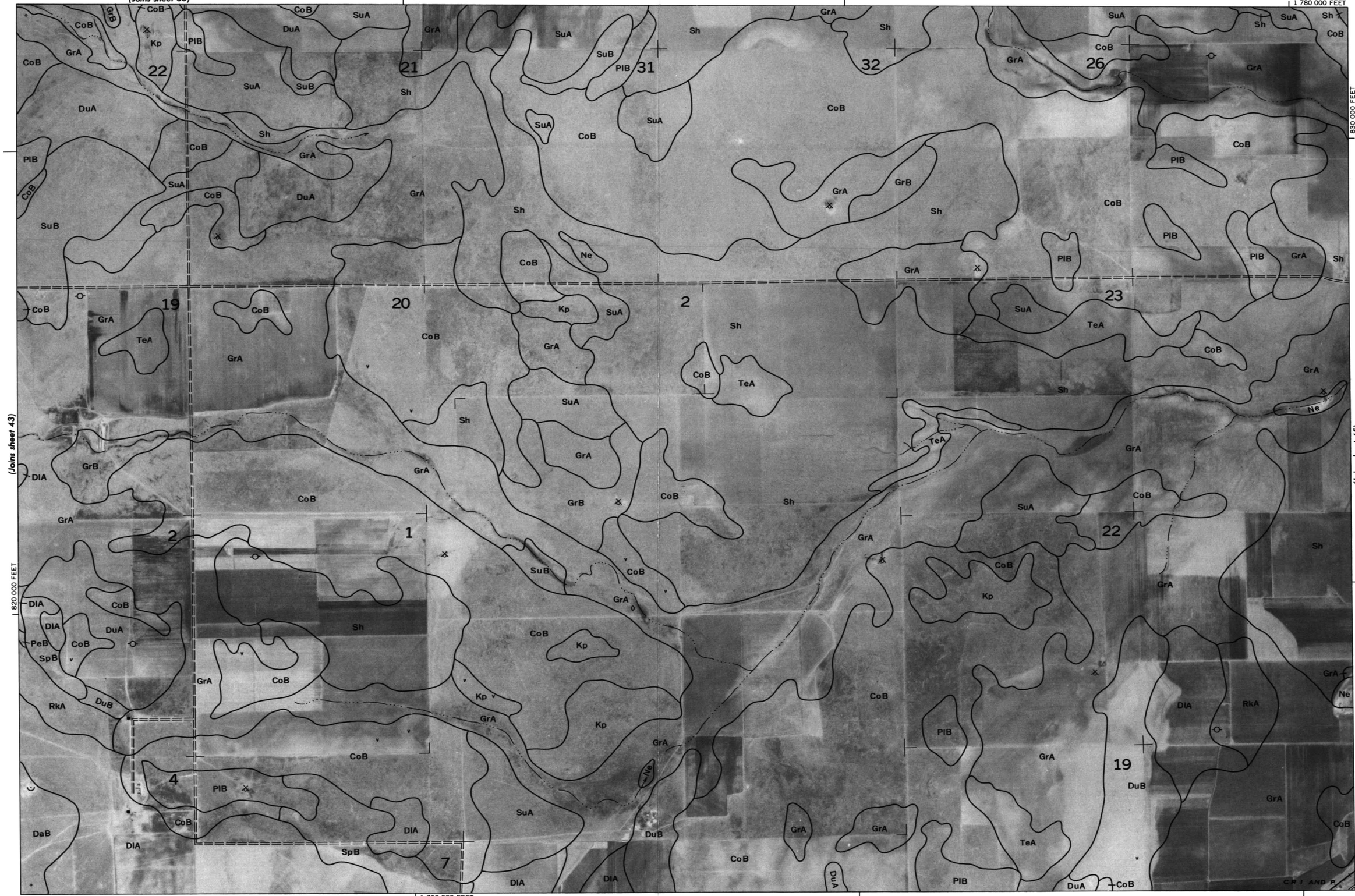
2 Miles 1 0 10 000 Feet

Scale 1:24 000

1 ¾ ½ ¼ 0 1 000 2 000 3 000 4 000 5 000

1 ¾ ½ ¼ 0 5 000

DALLAM COUNTY, TEXAS — SHEET NUMBER 44



N

2 Miles — 10 000 Feet — 1 — 5 000

Scale 1:24 000

0 — 1 000 — 2 000 — 3 000 — 4 000 — 5 000

Land division corners are approximately positioned on this map.

Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.

DALLAM COUNTY, TEXAS NO. 44

54

DALLAM COUNTY, TEXAS — SHEET NUMBER 45

DALLAM COUNTY, TEXAS NO. 45

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.
Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.
Land division corners are approximately positioned on this map.

45

N

2 Miles
10 000 Feet

Scale 1:24 000

(Joins sheet 37)

1 570 000 FEET

810 000 FEET

800 000 FEET

1 550 000 FEET

(Joins sheet 47)

(Joins sheet 55)

N

2 Miles

10 000 Feet

Scale 1:24 000

1 5 000 0 1 000 2 000 3 000 4 000 5 000

¼ ½ ¾

NEW MEXICO

UNION COUNTY

Land division corners are approximately positioned on this map.

Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.

DALLAM COUNTY, TEXAS NO. 46

DALLAM COUNTY, TEXAS NO. 47

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.
Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.
Land division corners are approximately positioned on this map.

47

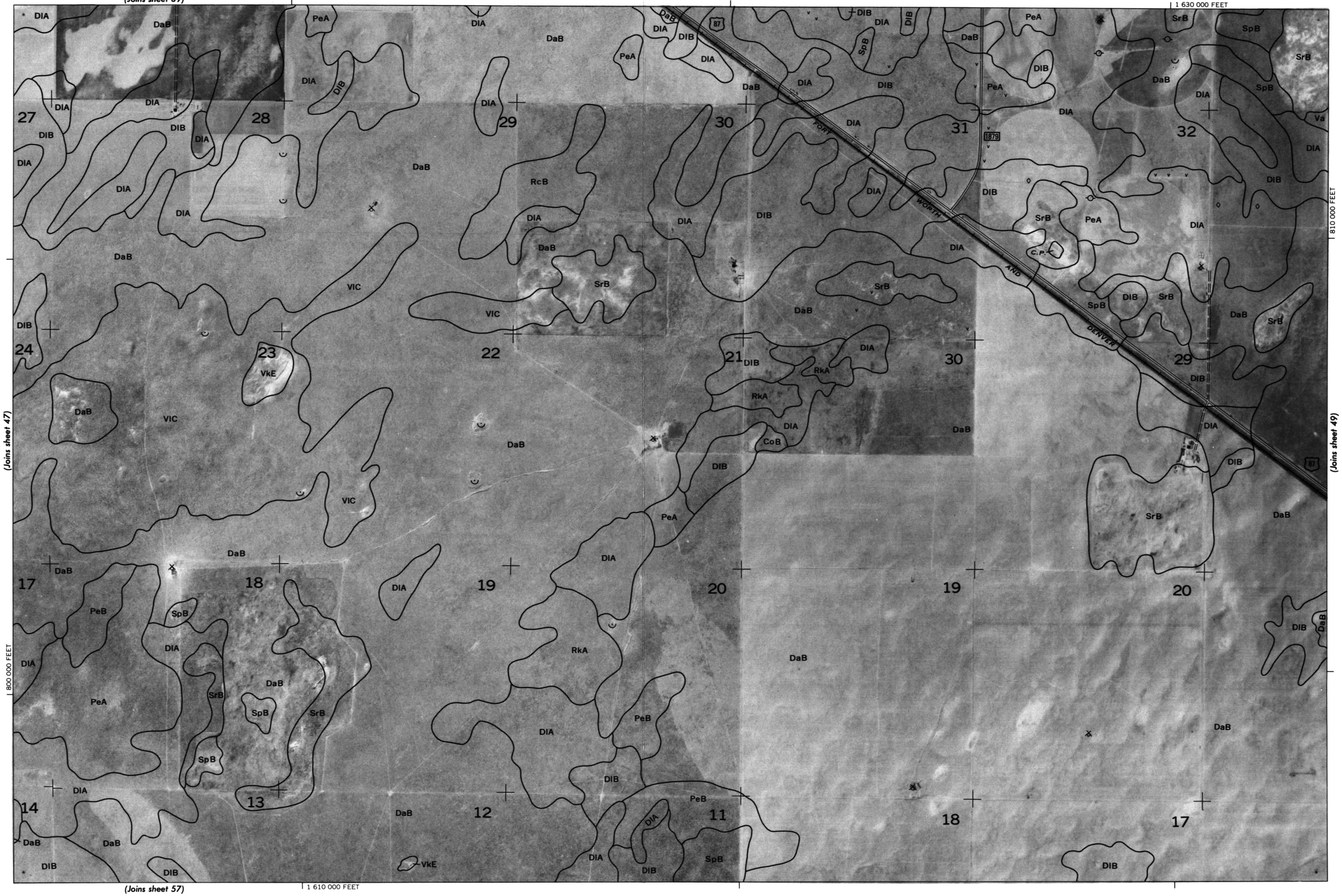
N

2 Miles
10 000 Feet
1
5 000

Scale 1:24 000

0 0
1/4 1 000
1/2 2 000
3/4 3 000
1 4 000
5 000

DALLAM COUNTY, TEXAS — SHEET NUMBER 48



Scale 1:24 000

1 Miles 0 1 2

1 5 000 0 5 000 10 000 Feet

¾ 4 000 ½ 3 000 ¼ 2 000 0 1 000

Land division corners are approximately positioned on this map.

Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.

DALLAM COUNTY, TEXAS NO. 48

DALLAM COUNTY, TEXAS NO. 49

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.
Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.
Land division corners are approximately positioned on this map.

(Joins sheet 48)

(Joins sheet 40)

1 640 000 FEET

810 000 FEET

Rita Blanca Creek

Rita

Blanca Cr

Creek

FORT WORTH AND DENVER

Ware

33 34 35 36 48 47

28 27 26 25 31 32

21 22 23 24 30 29

16 15 14 13 13 14

RcB SrB DaB DIA DIB PeA VIC Va SpB PeB RkA VkE SuA GrA PcB CoB

(Joins sheet 50)

(Joins sheet 58)

1 660 000 FEET

800 000 FEET

N

2 Miles

10 000 Feet

Scale 1:24 000

N

Scale 1:24 000

2 Miles 1 0

10 000 Feet 5 000 0

¼ 1 000

½ 2 000

¾ 3 000

1 4 000

5 000

(Joins sheet 41)

(Joins sheet 49)

(Joins sheet 59)

(Joins sheet 51)

1 690 000 FEET

1 810 000 FEET

800 000 FEET

1 670 000 FEET

DaB VIC Va VkE SpB DIA DIB SrB DuA SuA PeA PeB Cr

Rita Blanca Creek

46 45 44 43 42 33 34 35 36 37 28 27 26 25 24 15 16 17 18 19

Land division corners are approximately positioned on this map.

Photobase from 1971 aerial photography. Positions of 10-000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.

DALLAM COUNTY, TEXAS NO. 50

DALLAM COUNTY, TEXAS — SHEET NUMBER 51

N

1 700 000 FEET

810 000 FEET

(Joins sheet 42)

(Joins sheet 50)

(Joins sheet 52)

(Joins sheet 60)

1 720 000 FEET

800 000 FEET

Scale 1:24 000

2 Miles 0

10 000 Feet 0

1 5 000

¼ 1 000

½ 2 000

¾ 3 000

1 4 000

5 000

DALLAM COUNTY, TEXAS NO. 51

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.
Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.
Land division corners are approximately positioned on this map.

N

2 Miles

10 000 Feet

Scale 1:24 000

1 | 0 | 1/4 | 1/2 | 3/4 | 1

5 000 | 0 | 1 000 | 2 000 | 3 000 | 4 000 | 5 000

(Joins sheet 43)

(Joins sheet 51)

(Joins sheet 53)

(Joins sheet 61)

1 750 000 FEET

810 000 FEET

800 000 FEET

1 730 000 FEET

Land division corners are approximately positioned on this map.

Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.

DALLAM COUNTY, TEXAS NO. 52

DALLAM COUNTY, TEXAS NO. 53

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.
Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.
Land division corners are approximately positioned on this map.

(Joins sheet 52)

1 760 000 FEET

(Joins sheet 44)

810 000 FEET

(Joins sheet 54)

800 000 FEET

(Joins sheet 62) 1 780 000 FEET

PACIFIC AND ROCK ISLAND CHICAGO

C.P.

54

53

N

Scale 1:24 000

2 Miles 1 0 10 000 Feet 5 000 0

¼ 1 000 ½ 2 000 ¾ 3 000 1 4 000 5 000

DALLAM COUNTY, TEXAS — SHEET NUMBER 54

(54)

N

2 Miles

10 000 Feet

Scale 1:24 000

1 5 000 0 1 000 2 000 3 000 4 000 5 000

(Joins sheet 45)

(Joins sheet 53)

(Joins sheet 63)

1 810 000 FEET

810 000 FEET

800 000 FEET

1 790 000 FEET

Conlen

807

54

C R I & P

2899

C.P.

17 16 13 12

324 323 322 321

325 326 327 328

358 357 356 355

359 360 361 362

SHERMAN COUNTY

Land division corners are approximately positioned on this map.

Photobase from 1971 aerial photography. Positions of 10-000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.

DALLAM COUNTY, TEXAS NO. 54

DALLAM COUNTY, TEXAS — SHEET NUMBER 55

55

DALLAM COUNTY, TEXAS NO. 55

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.
Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.
Land division corners are approximately positioned on this map.

1 550 000 FEET

790 000 FEET

780 000 FEET

1 570 000 FEET

(Joins sheet 46)

(Joins sheet 56)

(Joins sheet 64)

NEW MEXICO

UNION COUNTY

N

2 Miles

10 000 Feet

5 000

Scale 1:24 000

DALLAM COUNTY, TEXAS — SHEET NUMBER 56

56

N

Scale 1:24 000

2 Miles 1 0 10 000 Feet 5 000 0

¼ 1 000 ½ 2 000 ¾ 3 000 1 4 000 5 000

(Joins sheet 47)

(Joins sheet 55)

(Joins sheet 57)

(Joins sheet 65)

780 000 FEET

1 580 000 FEET

1 600 000 FEET

790 000 FEET

Carrizo Creek

C.P.

3110

808

Land division corners are approximately positioned on this map.

Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.

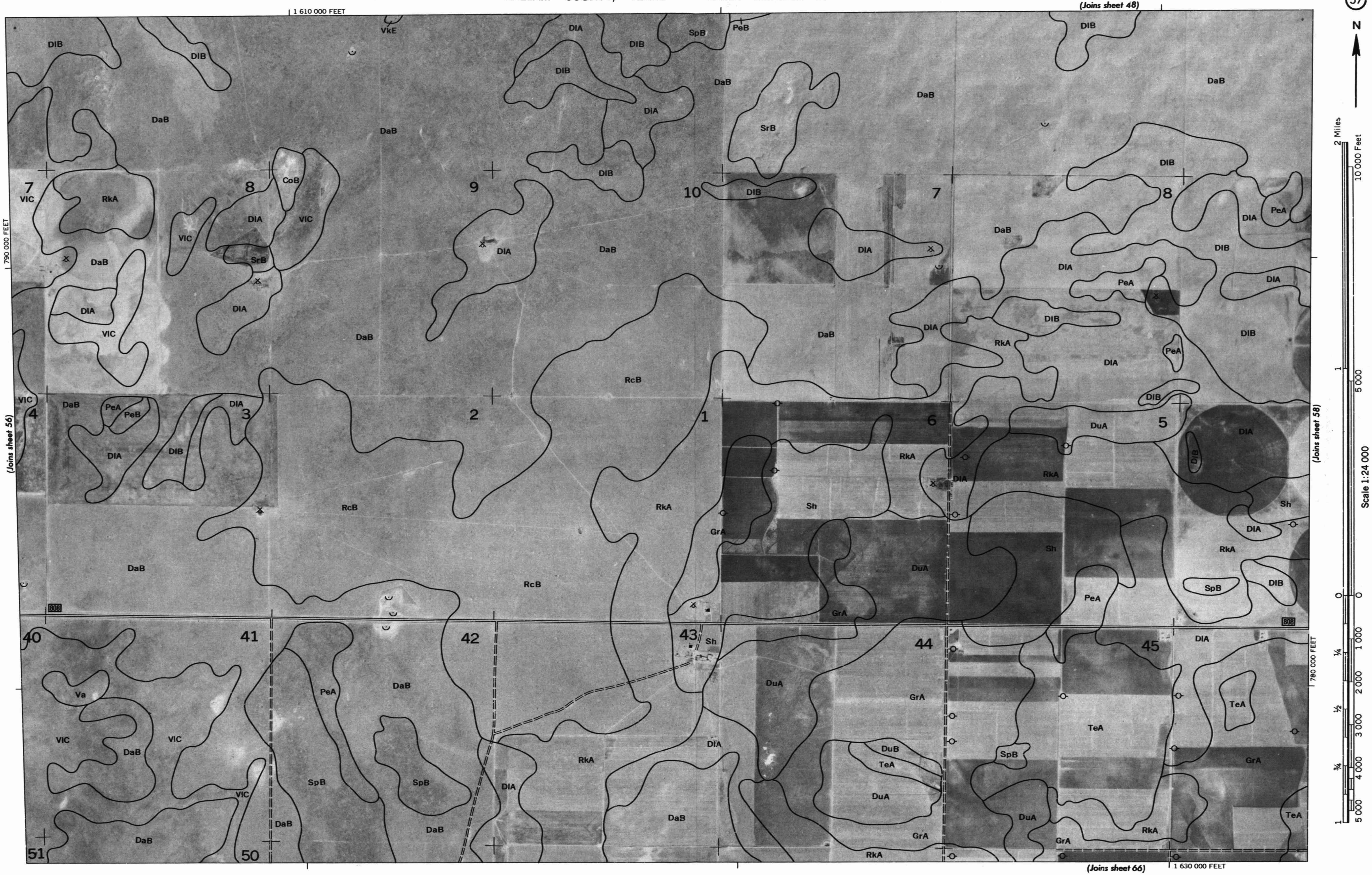
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.

DALLAM COUNTY, TEXAS NO. 56

DALLAM COUNTY, TEXAS — SHEET NUMBER 57

DALLAM COUNTY, TEXAS NO. 57

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.
Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.
Land division corners are approximately positioned on this map.



58

DALLAM COUNTY, TEXAS — SHEET NUMBER 58

N

(Joins sheet 49)

1 660 000 FEET

790 000 FEET

780 000 FEET

1 640 000 FEET

(Joins sheet 57)

(Joins sheet 59)

(Joins sheet 67)

2 Miles 10 000 Feet

1 5 000

Scale 1:24 000

0 0

¼ 1 000 2 000

½ 3 000

¾ 4 000

1 5 000

Land division corners are approximately positioned on this map.

Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.

DALLAM COUNTY, TEXAS NO. 58

DALLAM COUNTY, TEXAS — SHEET NUMBER 59

DALLAM COUNTY, TEXAS NO. 59

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.
Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.
Land division corners are approximately positioned on this map.

1 670 000 FEET

(Joins sheet 50)

790 000 FEET

(Joins sheet 58)

(Joins sheet 60)

780 000 FEET

(Joins sheet 68)

1 690 000 FEET

59

N

2 Miles

10 000 Feet

Scale 1:24 000

1 5 000 0 1 000 2 000 3 000 4 000 5 000

¼ ½ ¾

DALLAM COUNTY, TEXAS — SHEET NUMBER 60

(Joins sheet 51)

1 720 000 FEET

790 000 FEET

(Joins sheet 59)

(Joins sheet 61)

780 000 FEET

(Joins sheet 69)

1 700 000 FEET

N

2 Miles

10 000 Feet

Scale 1:24 000

1 5 000 0

¼ 1 000 2 000

½ 3 000 4 000

¾ 5 000

Land division corners are approximately positioned on this map.

Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.

DALLAM COUNTY, TEXAS NO. 60

DALLAM COUNTY, TEXAS NO. 61

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.
Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.
Land division corners are approximately positioned on this map.

(Joins sheet 60)

(Joins sheet 52)

(Joins sheet 62)

(Joins sheet 70)

1 730 000 FEET

790 000 FEET

780 000 FEET

1 750 000 FEET

N

2 Miles

10 000 Feet

Scale 1:24 000

5 000 0 1 000 2 000 3 000 4 000 5 000

1 ¼ ½ ¾ 1

Chamberlin

PACIFIC

ROCK ISLAND

CHICAGO

GALICHE PIT

54

38 37 36 18 17 7

41 42 43 19 20 6

46 45 44 22 21 1

DaB DIA DIB PeA PeB RkA SpB SrB VIC Ne CoB SuA SuB TeA PcB GrA PlB

62

DALLAM COUNTY, TEXAS — SHEET NUMBER 62

N

Scale 1:24 000

2 Miles 1 0

10 000 Feet 5 000 0

1 ¼ ½ ¾ 1

5 000 4 000 3 000 2 000 1 000 0

(Joins sheet 53)

(Joins sheet 61)

(Joins sheet 63)

(Joins sheet 71)

1 780 000 FEET

790 000 FEET

780 000 FEET

1 760 000 FEET

Land division corners are approximately positioned on this map.

Photobase from 1971 aerial photography. Positions of 10-000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.

DALLAM COUNTY, TEXAS NO. 62

DALLAM COUNTY, TEXAS — SHEET NUMBER 63

DALLAM COUNTY, TEXAS NO. 63

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.
Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.
Land division corners are approximately positioned on this map.

1 790 000 FEET

790 000 FEET

(Joins sheet 54)

(Joins sheet 62)

(Joins sheet 72)

1 810 000 FEET

780 000 FEET

63

N

2 Miles

10 000 Feet

1

5 000

Scale 1:24 000

1 000

2 000

3 000

4 000

5 000

1/4

1/2

3/4

SHERMAN COUNTY

DALLAM COUNTY, TEXAS — SHEET NUMBER 64

(Joins sheet 55)

1 570 000 FEET

(Joins sheet 65)

770 000 FEET

760 000 FEET

1 550 000 FEET

(Joins inset, sheet 73)

NEW MEXICO

UNION COUNTY

N

2 Miles

10 000 Feet

Scale 1:24 000

1 0 1 0

¼ 1 000 ½ 2 000 ¾ 3 000 1 4 000 1 5 000

Land division corners are approximately positioned on this map.

Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.

DALLAM COUNTY, TEXAS SHEET NO. 64

DALLAM COUNTY, TEXAS — SHEET NUMBER 65

DALLAM COUNTY, TEXAS NO. 65

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.
Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.
Land division corners are approximately positioned on this map.

1 580 000 FEET

1 770 000 FEET

(Joins sheet 64)

(Joins sheet 56)

(Joins sheet 66)

(Joins sheet 73)

1 600 000 FEET

1 760 000 FEET

N

Scale 1:24 000

2 Miles 1 0

10 000 Feet 5 000 0

¼ 1 000

½ 2 000

¾ 4 000

1 5 000

DALLAM COUNTY, TEXAS — SHEET NUMBER 66

(Joins sheet 57)

(Joins sheet 65)

(Joins sheet 67)

(Joins inset, sheet 74)

N

Scale 1:24 000

2 Miles 1 0

10 000 Feet 5 000 0

¼ 1 000

½ 2 000

¾ 3 000

1 4 000

5 000

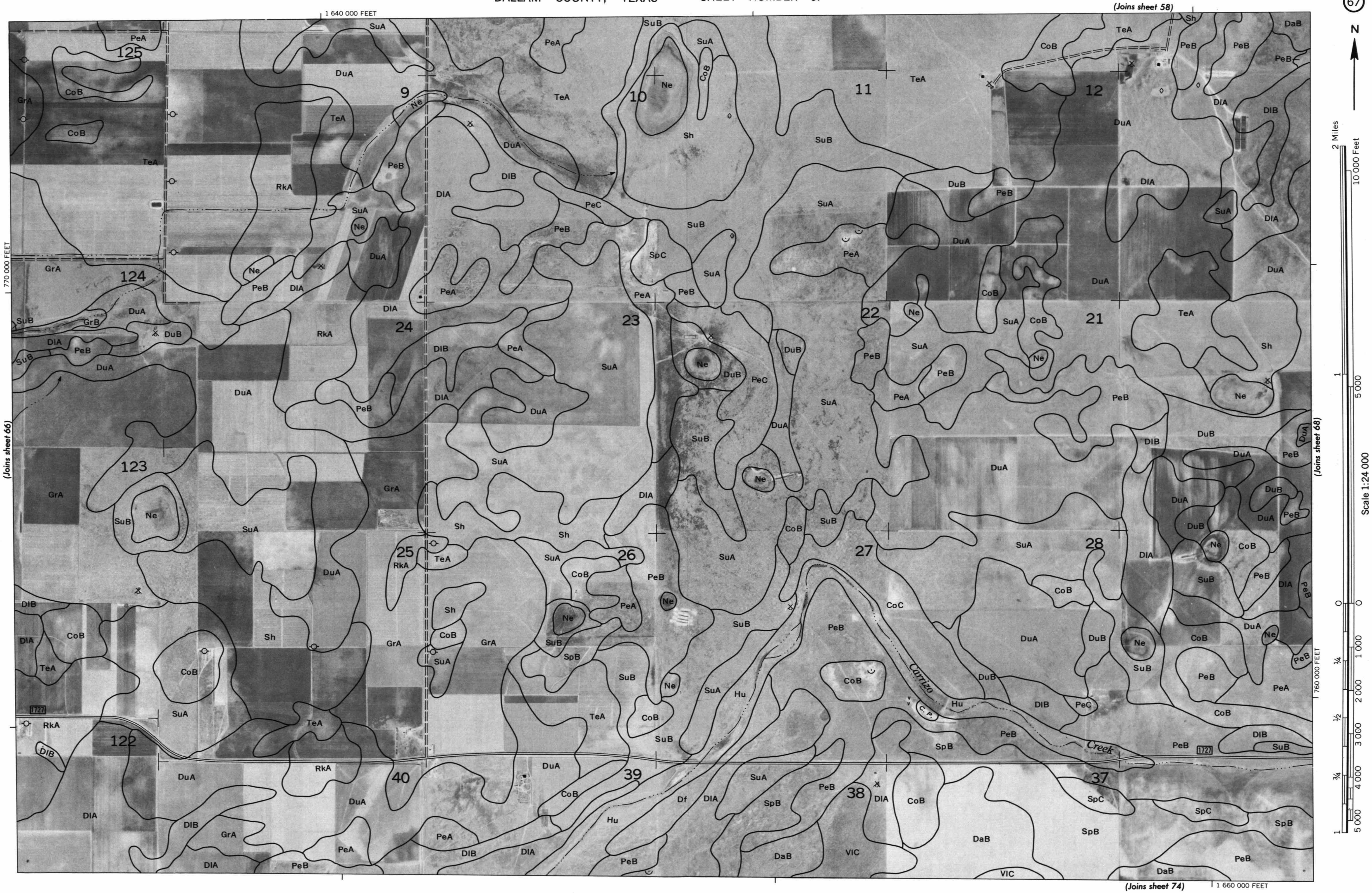
Land division corners are approximately positioned on this map.

Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.

DALLAM COUNTY, TEXAS NO. 66

DALLAM COUNTY, TEXAS — SHEET NUMBER 67



DALLAM COUNTY, TEXAS NO. 67

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.
Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.
Land division corners are approximately positioned on this map.

DALLAM COUNTY, TEXAS — SHEET NUMBER 68

Land division corners are approximately positioned on this map.

Photobase from 1971 aerial photography. Positions of 10 000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.

DALLAM COUNTY, TEXAS — SHEET NUMBER 69

DALLAM COUNTY, TEXAS NO. 69

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.
Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.
Land division corners are approximately positioned on this map.
(Joins sheet 68)

1 700 000 FEET

770 000 FEET

(Joins sheet 60)

69

N

2 Miles

10 000 Feet

Scale 1:24 000

(Joins sheet 70)

760 000 FEET

(Joins sheet 75)

1 720 000 FEET

DALHART
(county seat)

CALICHE PIT

C.P.

Radio Tower

PACIFIC

ROCK ISLAND

CHICAGO

FORT WORTH AND DENVER

AND

DALLAM COUNTY, TEXAS — SHEET NUMBER 70

Land division corners are approximately positioned on this map.

Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.

DALLAM COUNTY, TEXAS — SHEET NUMBER 71

DALLAM COUNTY, TEXAS NO. 71

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.
Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.
Land division corners are approximately positioned on this map.

(Joins sheet 70)

1 760 000 FEET

770 000 FEET

(Joins sheet 62)

(Joins sheet 72)

760 000 FEET

(Joins sheet 76)

1 780 000 FEET

71

N

2 Miles 1 10 000 Feet

Scale 1:24 000

1 5 000 0 0

¼ 1 000

½ 2 000

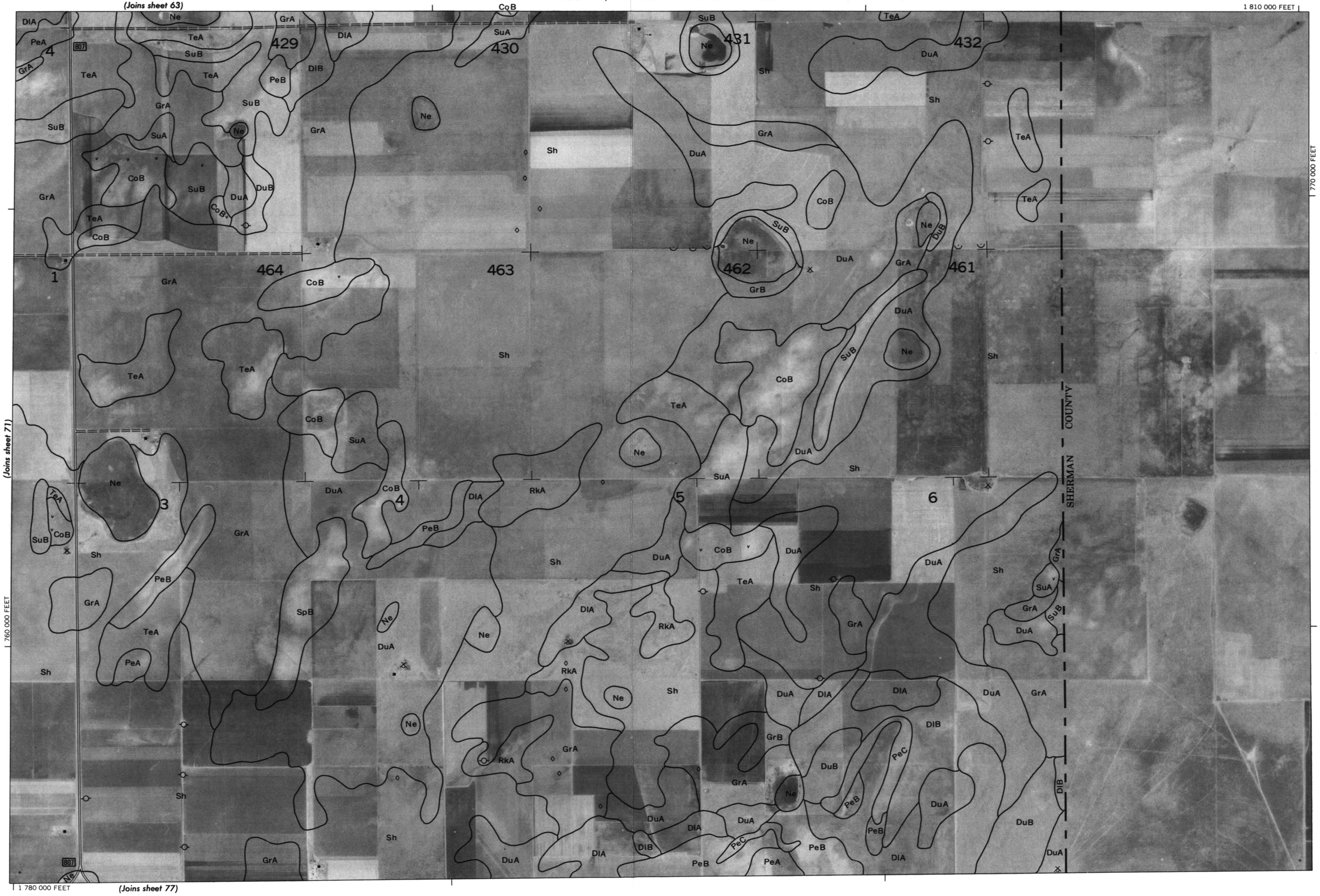
¾ 3 000

1 4 000

5 000

(72)

DALLAM COUNTY, TEXAS — SHEET NUMBER 72



N

2 Miles

10 000 Feet

Scale 1:24 000

1 5 000 0

¼ 1 000 0

½ 2 000

¾ 3 000

1 4 000

5 000

Land division corners are approximately positioned on this map.

Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.

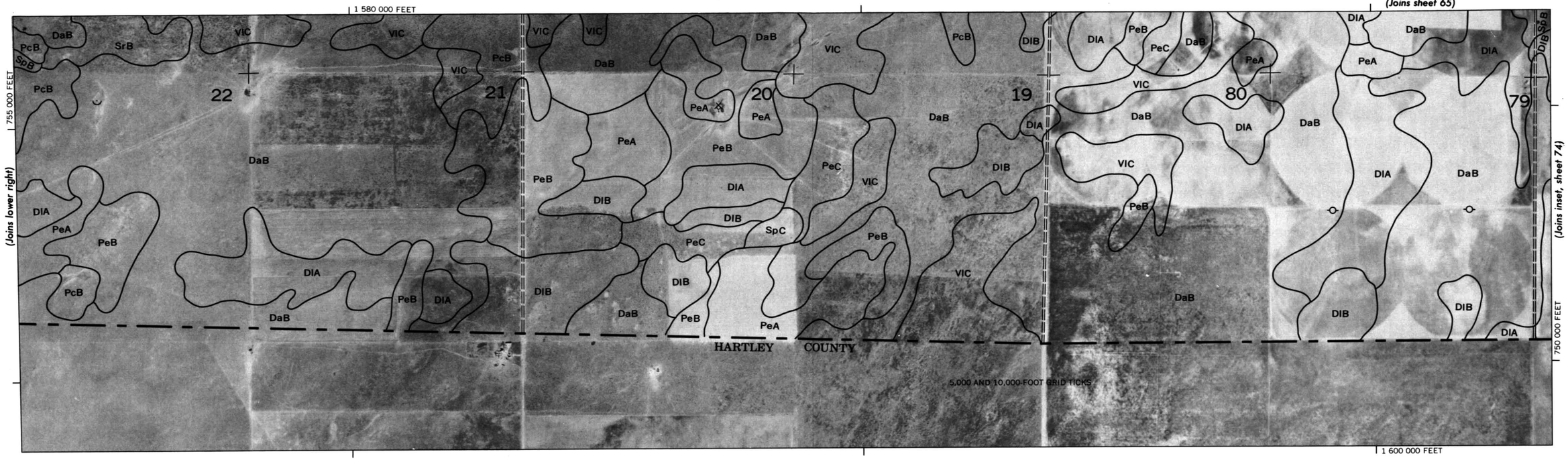
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.

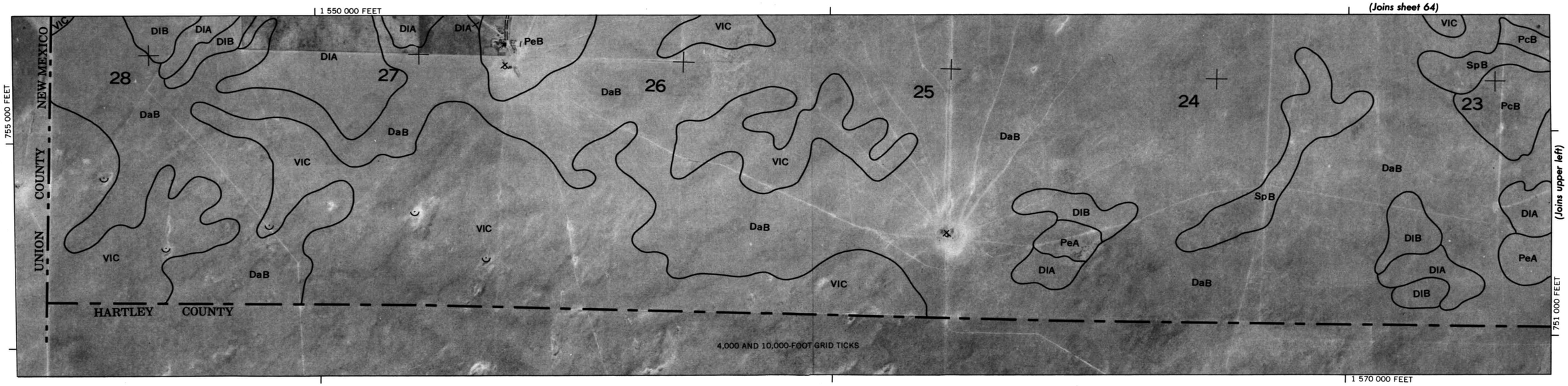
DALLAM COUNTY, TEXAS NO. 72

DALLAM COUNTY, TEXAS — SHEET NUMBER 73

DALLAM COUNTY, TEXAS NO. 73

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.
Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.
Land division corners are approximately positioned on this map.





N

2 Miles 1 0 10 000 Feet

1 5 000 0 5 000

1 ¼ 0 1 000 2 000 3 000

½ 0 2 000 3 000 4 000

¾ 0 3 000 4 000 5 000

Scale 1:24 000

DALLAM COUNTY, TEXAS — SHEET NUMBER 74

N

Scale 1:24 000

2 Miles 1 0 10 000 Feet

1 5 000 0 5 000

¼ 1 000 2 000

½ 3 000

¾ 4 000

1 5 000 0

(Joins sheet 67)

(Joins lower right)

(Joins sheet 75)

(Joins sheet 66)

(Joins sheet 73)

(Joins upper left)

1 660 000 FEET

1 640 000 FEET

1 630 000 FEET

1 610 000 FEET

750 000 FEET

755 000 FEET

HARTLEY COUNTY

5,000 AND 10,000-FOOT GRID TICKS

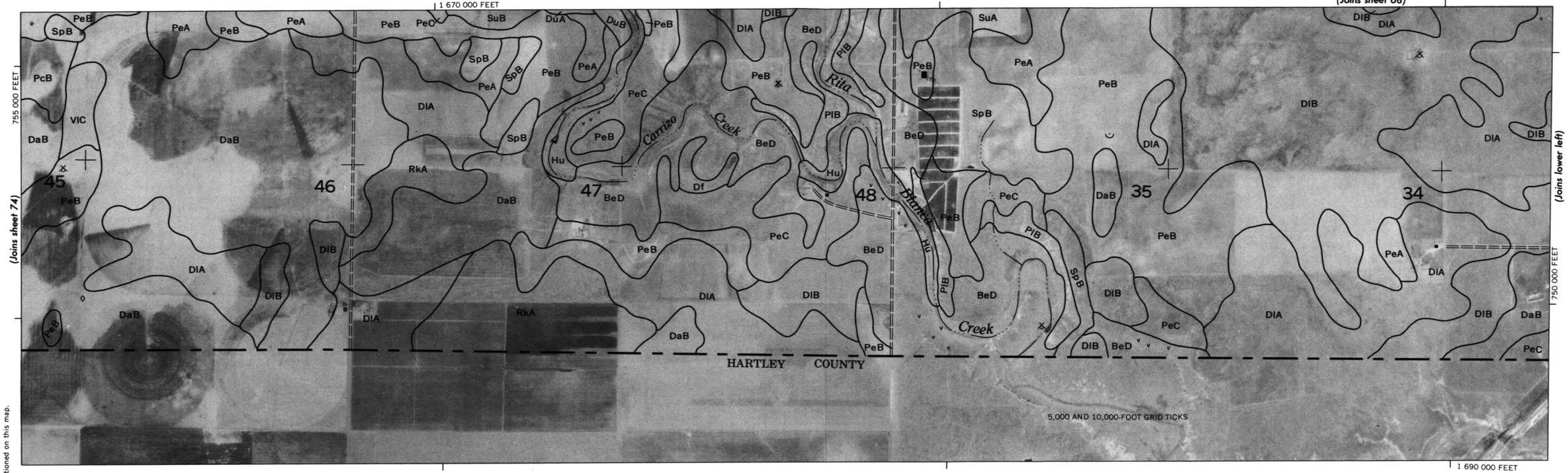
Land division corners are approximately positioned on this map.

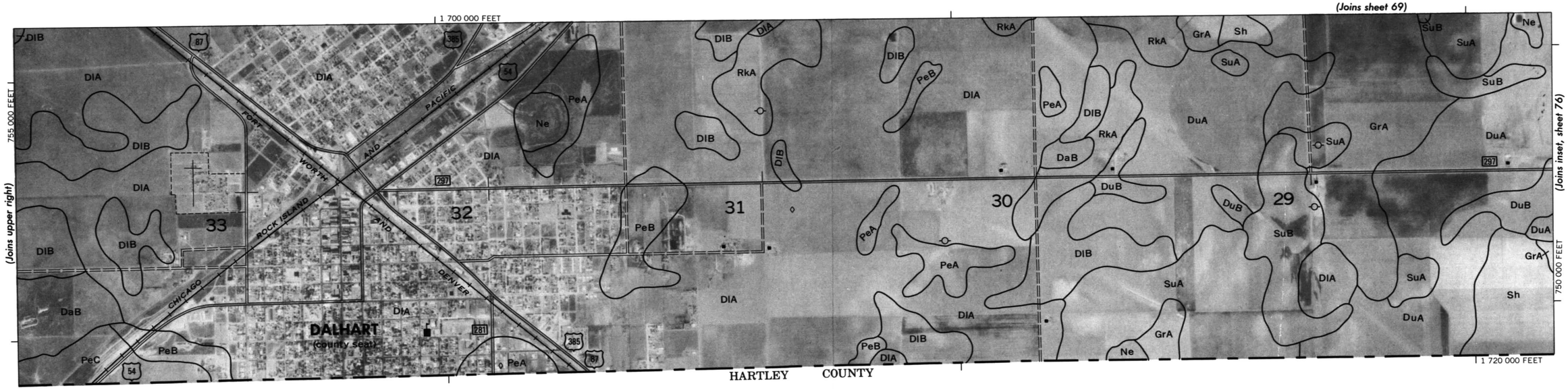
Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.

DALLAM COUNTY, TEXAS NO. 74

DALLAM COUNTY, TEXAS — SHEET NUMBER 75





DALLAM COUNTY, TEXAS NO. 75

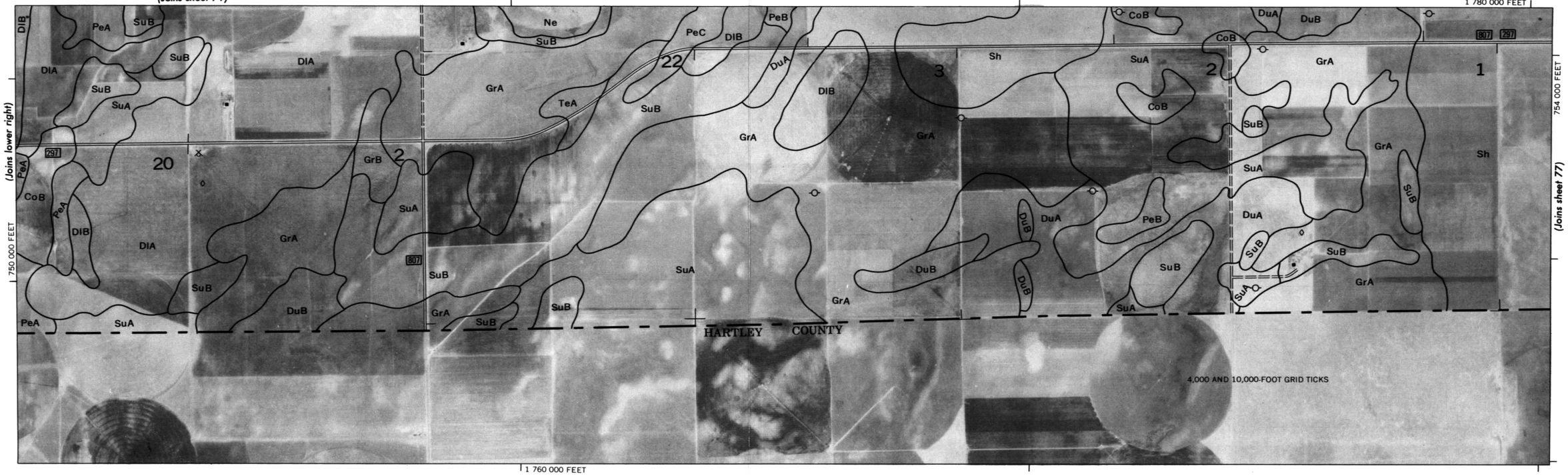
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.
Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.
Land division corners are approximately positioned on this map.

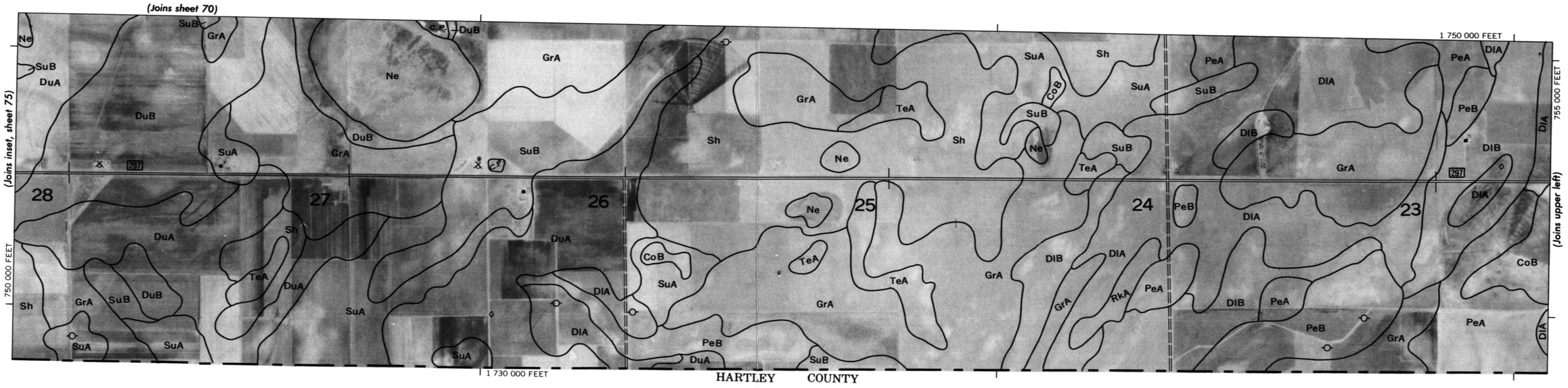
N

2 Miles
10 000 Feet
5 000

Scale 1:24 000

DALLAM COUNTY, TEXAS — SHEET NUMBER 76





Scale 1:24 000

2 Miles 10 000 Feet

Land division corners are approximately positioned on this map.

Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.

DALLAM COUNTY, TEXAS NO. 76

DALLAM COUNTY, TEXAS — SHEET NUMBER 77

DALLAM COUNTY, TEXAS NO. 77

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and Forest Service, and the Texas Agricultural Experiment Station.
Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Texas Coordinate System, North Zone.
Land division corners are approximately positioned on this map.

N

Scale 1:24 000

2 Miles
10 000 Feet
1
5 000
0
¼
1 000
½
2 000
¾
3 000
4 000
5 000